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TWELFTH ANNUAL REPORT

OF THE

RECLAMATION SERVICE

1912-1913

F. H. NEWELL, DIRECTOR

WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

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LETTERS OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR.
Washington, December 1, 1913.

SIR: In compliance with the provisions of section 2 of the act approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," I have the honor to transmit the accompanying Twelfth Annual Report of the Reclamation Service.

Very respectfully,

FRANKLIN K. LANE.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEPARTMENT OF THE INTERIOR,
UNITED STATES RECLAMATION SERVICE,
Washington, October 4, 1913.

SIR: Transmitted herewith is the Twelfth Annual Report of the Reclamation Service. This report relates in particular to work completed and in progress during the fiscal year ended June 30, 1913, but contains also information in regard to previous operations in order that the methods, progress, and results of reclamation work may be more readily understood.

Very respectfully, A. P. DAVIS, *Acting Director.*

The SECRETARY OF THE INTERIOR.

TWELFTH ANNUAL REPORT

OF THE

RECLAMATION SERVICE.

F. H. Newell, *Director.*

GENERAL DISCUSSION.

INTRODUCTION.

Evolution of the Reclamation Service.—The Reclamation Service began with the passage of the act of June 17, 1902. After the passage of this act the Secretary of the Interior, Ethan Allen Hitchcock, delegated certain authority to make surveys and examinations to Charles D. Walcott, Director of the Geological Survey, who in turn committed the initiation of the work to a few men who had been examining into the extent to which the arid lands might be reclaimed by measuring streams and surveying reservoir sites. Month by month the forces engaged in such survey and examination were increased; engineers and assistants were added, experienced consulting engineers were employed, finally construction of the works was begun, and the term "Reclamation Service" was gradually applied to this group of men.

Present organization of the service.—After 10 years of growth the service has evolved into an intricate organization with a multitude of duties. It not only surveys and examines possible projects but builds these in whole or in part by contract or by its own forces. In connection with this construction it operates construction camps, hospitals, boarding houses, mercantile stores, and even places of amusement; it has railroads and transports passengers and freight at schedule rates; it has telephone systems and collects tolls for messages. But far more important than this, it delivers water to thousands of individual farms, keeps record of the time and quantity of these deliveries and of the crops raised, and in this manner is brought into immediate personal contact with the human affairs of thousands of citizens.

All authority flows from the Secretary of the Interior. At the beginning of each year plans and expenditures are approved in advance by the Secretary, as these plans are completed in detail. The proposed expenditures are again submitted to the Secretary for approval at the beginning of each quarter, so that the Treasury officials may have his specific authority for making payment. In addition to the annual and quarterly approvals, each specific large

contract or construction is again submitted to the Secretary, so that in all steps of financial affairs the Secretary has complete control.

So it is with the legal matters. The broad features are worked out on the ground, and every contract or form of contract, after having been prepared with full reference to the local conditions, is passed upon in the Secretary's Office by the Assistant Attorney General or handled in the field by the district attorneys of the Department of Justice. The fiscal affairs—the payment and receipt of money—are handled by special fiscal agents, all under heavy bond and reporting directly to the Treasury Department.

Prior to the present administration executive control, under the Secretary of the Interior, was vested in the director and, associated with him, the chief engineer. The administrative control and management is now lodged in five officials, each of whom is charged directly with the affairs of a single division, but who confer on all matters affecting the service as a whole and in conference decide upon all questions, which decisions are referred to the Secretary of the Interior for approval. These officials are F. H. Newell, director; A. P. Davis, chief engineer; Judge Will R. King, chief counsel; W. A. Ryan, comptroller, in charge of finances and accounts; and I. D. O'Donnell, supervisor of irrigation. This joint body is known as the United States Reclamation Commission.

The last-named member has an office in Billings, Mont., and devotes only a part of his time to the service. The other members of the commission are expected to alternate in the Washington office and in the field, so as to keep in close personal touch with the Secretary, with the water users, and with the field forces. The work is so widely scattered and has progressed so rapidly that it has outgrown the administrative possibilities of any one man, and for this reason the manifold duties heretofore devolving upon the director have been divided so that five men shall give a close personal study and attention to the many details necessary for the proper management of so large an undertaking.

The field of work embracing the arid and semiarid region is divided into several districts, each in charge of a supervising engineer who reports to the Washington office. Each has the supervision of several projects and spends most of his time traveling from point to point, advising the project engineers or managers who are resident on the project. These projects are usually large and may be 50 to 100 miles in length. In case of large construction there is necessarily on each of the large features, such, for example, as a storage dam, a resident engineer in direct charge of that piece of construction. In the operation and maintenance, also, the project manager has under him the superintendents of irrigation, each perhaps in charge of a large canal or group of canals.

In addition to the direct line of authority from the Secretary there has been found to be need of certain experts and consulting engineers. These are called in frequently on difficult problems of foundation of dams or of technical work. Electrical and cement experts are also needed as well as drainage men acting largely in a consulting capacity. These men are located at points most convenient to the work itself, generally at centers of population where material can be had in emergency or laborers employed.

In addition to these officers outside the projects is a purchasing and shipping agency in Chicago, near the headquarters of the great railroad systems. Here are clerks who take up the railroad claims and who lay out or route the freight, such as machinery purchased in the East.

Historical review.—The past year, including the crop season of 1913, has shown a steady progress in the work of the Reclamation Service and an increase in the area reclaimed by irrigation. The Newlands or reclamation act, under which the work is being conducted, was signed on June 17, 1902, and thus 11 full years have elapsed during which operations have been pushed forward as rapidly as possible with the funds available and with the limitations imposed by legal or other conditions. The activities of the 11 years may be considered under three stages of growth:

(1) That of survey, examination, tentative approval, and adoption of the projects, nearly all of which were practically selected under the direction of Secretary E. A. Hitchcock during the years 1902 to 1906.

(2) Then came the period of active construction during which many of the larger dams, canals, and tunnels were built, and the problems of efficient and economical building were given most attention. This extended up to about 1910.

(3) Next succeeded the present era of problems more intimately connected with human nature and its limitations, namely, those of the settlement of the land and its use by newcomers.

In the previous annual reports these matters have been touched upon, but the steadily growing importance of the human problems demand still further consideration. In this connection the most important item is the fact that there have been reclaimed, or water has been provided, for over 1,200,000 acres, at a cost to the Government of an average of not far from $50 per acre. During 1912 a little over one-half of this area was actually in use, although only 2 per cent of the Government farms prepared for irrigation have not been filed on.

In the handling of the physical problems of engineering and the related legal questions there are certain definite facts or principles which could be measured or judged by well-known rules, but in the development and use of the irrigable lands for which the works are provided, instead of machinery or tools, it is necessary to work with men who are not directly controlled as employees, but on the contrary must be dealt with as partners or coworkers in this great undertaking.

When the reclamation act was under discussion, and even for some years after it was passed, it was assumed that the Government would simply build the reservoirs and main-line canals to store the floods and bring the water out to a point where the settlers might take it and distribute it in smaller canals built by themselves.

The first comers had already taken up and partly utilized most of the easily available sources of water supply, and it was conceived to be the duty of the General Government, which was also the owner of great bodies of public lands, to make conditions such that the succeeding wave of settlers would find them about as they were previously found by the pioneers. In other words, where the natural streams had been appropriated, it was desired to provide what was equivalent to similar artificial streams from which the water might be taken by settlers arriving at a later date.

The lack of complete success in following this idea lay in the failure to consider the fact that the pioneers had only nature to fall back upon, and in time of discouragement were forced by stern necessity to utilize conditions as best they could, and as they found them. The later comers, however, finding the artificial streams provided by the Government, naturally feel that they have recourse to the Government, if conditions prove to be difficult, to improve these artificially created conditions. Thus, while nature was stern and unyielding to the pioneers and would go no further in ameliorating conditions, the general government is far more amenable to importunity.

It was found to be impossible to utilize immediately the larger reservoirs and canals built by the Government unless it did proceed further and build also the distributing system, taking the water to points nearer the farming land.

The individual entrymen on the farm units and the owners of private lands included in a project were apparently unable to organize for mutual assistance in the building of the distributing system as was done by the pioneers, and it appeared that the large works would stand idle for a time at least unless the water was brought within a mile or less of each farm unit.

In order to expedite the development of the country and the use of the stored water, the reclamation work was continued, and hundreds of miles of small canals and laterals and thousands of small structures, such as flumes, culverts, bridges, and turnouts, were built. These added notably to the cost of the water rights, and, while appreciated at the time by the settlers, this added cost ultimately gave rise to innumerable complaints on the ground that the completed works carrying water to the land cost more than was originally anticipated. As above stated, this is attributable not only to the fact that the original or preliminary plans did not contemplate doing so much for the farmer, but left more to be done at his own expense by him or by cooperation with his neighbors, but also to the great increase in cost, during the construction period, of materials of all sorts, labor, rights of way and other property, and of stock and feed in the neighborhood of the construction work.

The Government has provided detailed distribution systems and numerous structures demanded by the water users that would probably not have been considered immediately necessary if the work was being performed more directly at the expense of the individuals.

The conditions now are that the Government has built a number of irrigation systems that for completeness and permanence stand well in advance of any in the United States, or even abroad. This has been done at a reasonable cost to the water user for size, difficulty, and quality of construction. The ultimate success of these great works, however, rests not wholly upon their engineering or mechanical perfection, but upon the success of the farmers for whose use they were built. His success, in turn, depends upon his efficient use of the land and water provided by the Government and of his own labor and resources. Thus the success of the individual farmer is not only the highest consideration from the humanitarian standpoint, but also from that of the statesmen and the builder of the works. Every effort should be and is therefore being made to promote the success of the farmer, and on the basis of his success to increase the prosperity of the country.

The chief obstruction to success lies not only in the natural difficulties, but even more in the aggravation of these by the complications resulting from the presence of men who, under the guise of obtaining land for the support of their families, are really endeavoring to profit unduly by the efforts of their neighbors, and who, whether owning little or much land, are holding back the development of the country and to this extent defeating the purposes of the reclamation act. It is difficult to distinguish between these men and the farmer, but the best single test is that of actual residence on the land and cultivation of it. The real farmer, the man who makes the principal part of his living by the tilling of the soil, is found living on the farm. He has learned that he can not successfully raise crops while sitting in a real estate office or corner grocery in town.

To illustrate the conditions in the arid West and the difficulties that are being encountered, it is convenient to distinguish various classes of entrymen or landowners as follows:

(*a*) The farmer who lives on the farm and spends his working hours in his fields. This is the type of man who should be given most encouragement, as it is his skill and labor intelligently applied that is adding to the permanent values of the country.

(*b*) The owner who lives on the farm, but spends most of his time in town or at some other occupation in which he can earn more money than he can at farming. This man, while desirable, is usually not developing his land to its full extent.

(*c*) The man who lives in town and spends his money in development of his farm, perhaps in setting out an orchard. He is doing this usually with the idea of investing his savings and with the hope of ultimately having a home. It has been argued that encouragement should be given to such a man and to the development of orchards in this way, but experience has shown that nonresidents are often unsuccessful and ultimately sell their farms. By not living on the farms they are not doing their share as citizens in building up the locality. They are investors in farm property, but are seldom farmers.

(*d*) Men who neither live on their farms nor invest money in the improvement of the soil. These men are speculators, and, although they may be estimable individuals, they are a great obstacle to the success of the reclamation act, as they withdraw the land from use and directly or indirectly aid in inflating prices to a point that renders profitable farming difficult, if not impossible.

These classes of landowners merge into each other, and it is impossible to draw any sharp line between them. In fact, many a man believes that he will put to best use the land that he is holding, but defers taking action from month to month or from year to year with corresponding loss to the community while he is holding the land. He is putting the Government to expense directly or indirectly through his failure to utilize the irrigation system or pay for the water provided for the land.

Whenever occasion arises that amelioration of terms of payment for water may be considered, it is of the highest importance that this be granted only to the man who is living on his land and who is cultivating it in good faith, making his principal occupation that of tilling the soil.

Investment by irrigator.—To attain success a larger investment must be made by the irrigator than was assumed by many at the time of the passage of the reclamation act. On the basis of $20 per acre for storing and turning water into the main line canals the investment by the Government in the reclamation of a 40-acre tract would be $800. It was generally understood that the investment to be made by the settler would be correspondingly small. As conditions have developed, however, it has become apparent that the Government must bring the water nearer the land; and although this reduces the immediate investment by the settler, and one that otherwise would have been made by him in providing the distribution system, yet, nevertheless, he must invest a far larger amount of money than anticipated in providing necessary equipment.

The present cost of storing, diverting, and distributing water for irrigation averages not far from $50 per acre, or $2,000 for a 40-acre irrigated farm. This is the amount of money which, in one sense, the Government advances for the benefit of the settler and which he is to repay to the Government without interest at some future time. This advance or loan is by no means sufficient to put the settler on his feet. On his part he must be able to provide, directly or indirectly, an equal or larger sum to be used in building a house, a barn, and in procuring live stock, tools, and other equipment, and in the leveling of the ground. Not all of this money or its equivalent in labor is applied at once. Some men of unusual energy and skill, who are willing to submit themselves and their families to great discomfort, may get along with a considerably less amount of money, but on an average it may be said that at least $2,500 to $3,000 must be invested by the settler within the first two or three years on a small farm, not including the purchase price of the land. Farming under an irrigation project in the beginning is fraught with hardships and privations. While there are numerous instances of men who, with practically no capital, but only their ability to render hard intelligent work on their land, have made phenomenal successes, the percentage is largely against them, and it is better to know the whole truth and perhaps discourage a possible success from making the attempt than that a probable failure be urged to make the effort. There is nothing mysterious about farming under irrigation and nothing that can not be mastered by an intelligent man, able and willing to work; and, under irrigation, the intelligence of the worker counts more than in almost any class of farming.

One of the most important items in connection with development of the irrigated land has been the ability of the settler to secure an advance of money or a loan to enable him to develop his land. In the case of homestead entries there is little real security offered to the money lender, and the interest rates are correspondingly high, being from 8 to 12 per cent or even more. In order to obtain title to the land as a basis for the loan the homestead act has been amended, providing for acquiring title after three years' residence, in place of five years, but, as in the case of privately owned land, the Government necessarily holds what is equivalent to a first mortgage for payment for water, and bankers or money lenders are naturally cautious about making loans in such cases.

There has been considerable debate in the public press and in correspondence as to the best course to be pursued with reference to securing larger credit for the pioneer irrigator and further loans at reasonable rates of interest. One suggestion made has been that the Government not only advance, as has been done, the capital for providing the water, approximately $2,000 for a 40-acre farm, or $4,000 for an 80-acre tract, but in addition break up and level the land and even make loans of cash or credit to procure farm equipment. It has been pointed out that this is done in other countries, and that in Canada in some instances farms have been planted to the first crop and further credit given to the new settler. It is to be noted, however, that in the latter case extreme care is taken and careful discrimination is made as to the individual would-be borrowers based on their previous history and financial standing. Such discrimination would be very difficult for the Government to exercise or to demand under the present laws.

In recognition of the fact that through the first few years there is necessarily large outgo and small income, the Secretary of the Interior has in many instances approved a graduation of annual payments for water rights, such as to require a tenth down and then relatively small amounts during the second, third, and fourth years, conditioned, however, upon actual cultivation of the soil and improvement of the farm equivalent to the reduction of payment. The application of this principle is found to be yielding good results, and, as before stated, any similar concession should be made on the basis of thorough cultivation, so as to make every possible inducement for use of the reclaimed land.

Every encouragement should be given to the man who is making his home on the reclaimed land and cultivating it effectively. Such a man should be recognized as cooperating with the Government in its efforts to promote the prosperity of the Nation. It is generally admitted that few men can succeed as farmers or properly utilize the opportunities offered by the Government unless they devote their entire time and energies to the cultivation of the irrigated lands, and that the greatest obstacle to the success of the reclamation act lies in the man who is unwilling or unable to utilize effectively the bounty of the Government or the money advanced in reclaiming the land.

During the first three or four years the irrigator must expect to make large investment of his own money and labor in leveling and subduing the soil and to receive small returns. During these years, as before noted, he should not be expected to make large payments for the cost of the water. Any concession, however, in this regard should be made strictly contingent upon actual and continuous cultivation.

Such concessions should not be made to any man who is holding his land out of use for the purpose of gaining a benefit through the increased value resulting from the efforts of his neighbors. The difficulties and expenses encountered by the man who is attempting to make his home on the land are increased directly or indirectly by the speculative unimproved holdings that do not bear their full share of the burden of maintenance of schools, roads, and other improvements. On the other hand, if the lands that are being held out of use were now in the ownership of men who would live upon them, the

presence of these men in the community and their efforts in cultivating the soil, in keeping down the growth of weeds, and in numerous other ways would redound to the benefit of the entire community. In short, the object of the reclamation act would be much better accomplished.

Cooperation.—In the work of the Reclamation Service especial attention has been paid to increasing the cooperative results, not only with the water users individually and collectively, through the water users' associations, but with various agencies of the State and Nation. In Idaho a contract has been entered into with the Pioneer irrigation district, involving the expenditure of about $350,000 in the drainage of lands within the district and $560,000 for storage capacity in Arrowrock Reservoir; in Washington a contract has been made with the Kittitas irrigation district in order to provide an adequate water supply to the Kittitas lands from the storage reservoirs of the Yakima project; and in Oregon cooperation is being had with the State in connection with the investigation of the Deschutes River Basin. Cooperation with private irrigation interests has been provided for under the Warren Act in Idaho, Nebraska, Washington, and Wyoming. A series of conferences was held during the fall and winter of 1912–13, notably at agricultural colleges in various arid States and with managers of private irrigation projects and others interested. The discussions that followed embraced a wide range of subjects, but principally those that had to do with the operation of irrigation systems and the relations with the water users.

Cooperation within the Department of the Interior has been had with the Geological Survey in the measurement of streams and determination of water supply available; also with the Land Office in matters of public land and examination of titles; and with the Indian Office in the construction of works, particularly on the Flathead, Blackfeet, and Fort Peck Reservations in Montana. It is hoped and believed that by such cooperation greater efficiency and economy is secured in carrying out the work in hand, accompanied by mutual advantage such as is secured in distributing the work to the agencies best qualified to carry it on.

Cooperation has also been had with the various bureaus in the Department of Agriculture, notably the Forest Service, in connection with the protection of the watersheds above the larger reservoirs; and with the Bureau of Plant Industry in its experimental farms on several of the projects, these being operated under an agreement made in accordance with appropriations for the Bureau of Plant Industry, "For investigations in connection with the utilization of lands reclaimed under the reclamation act and other areas in the arid and semiarid regions." These appropriations have been made annually since 1909 for amounts ranging from about $70,000 to $75,000. Arrangements have also been effected for expert agriculturalists to act as advisors of the irrigators on each of the projects, the Secretaries of Agriculture and the Interior cooperating to that end.

Cooperation has also been sought and obtained from the Bureau of Standards, in the Department of Commerce, especially in connection with investigations of cement and concrete, and with the Bureau of Fisheries in connection with plans for fishways.

The largest results yet to be accomplished are in the securing of more effective cooperation between the individual water users and their organizations. Theoretically, it should be possible to secure a high degree of effectiveness, but experience has shown that the farmer under a new project is so busy with the details of his own work that it is extremely difficult to obtain active interest in those things which an outsider might regard as of first importance. For example, the agricultural experiment stations on certain projects have connected with them men who are competent to advise the newcomers. It would be assumed that the majority of farmers would visit the nearest experiment farm frequently to see what has been done of interest and value to them and would eagerly seek advice on their difficult problems, but the contrary is the case. It is difficult to interest many of them in the experiments being carried on for their benefit, and the tendency has been to rely upon advice or suggestions of some near neighbor, who may be misinformed.

It is to overcome this very natural tendency and in order to promote confidence and cooperation between the Reclamation Service and the farmer that the Secretary of the Interior has planned to secure experts from the Department of Agriculture, who shall visit the farms and counsel and advise with the farmer on his own land.

It has become evident that the irrigator should be visited on his own farm and that the difficulties which he is encountering should be studied on the ground in the same way that the troubles of a manufacturer of goods are solved in the factory. The general principles or theory can be taught elsewhere, but the far more difficult practical application of the lessons can only be had in the fields where and when the crops are growing. It is this condition that has not hitherto been fully recognized, but that is being made more prominent as experience is had in the development of irrigated lands.

Self-government is the basis of effective cooperation, and for success must be joined with the attitude of mind that gives motive force to cooperative institutions, and with the development of those qualities of character that enable men to organize and keep up the cooperative efforts.

The people on the different projects, whether farmers, merchants, or bankers, are realizing that they must pull together in solving the general difficulties. At first, the obstacles to be overcome by the individual have necessarily absorbed all his energies. The moment he sees any relief in this direction he is confronted by the still larger problems of cooperation for building up the entire commonwealth. In other words, the individual irrigator can not stand alone, but is forced in the proper handling of the irrigation system and in the proper disposal of his crops to become an effective unit in the greater scheme of cooperation and of mutual assistance.

The State agricultural colleges and experiment stations are gradually taking up this matter, and the Federal Department of Agriculture has also entered upon the study of farm management and is making provision for farm advisors, following largely the methods successfully pursued in the South. The conditions, however, are quite different in a new country from those that have been so effectively met in the older regions, where the population is relatively permanent, and where through many years or generations there have developed certain definite ideas of crop production and markets.

It is probably well within the truth to say that agriculture owes its prosperity in all the older nations of Europe almost entirely to the practice of agricultural cooperation. In agriculture, as in every other human pursuit, the unorganized interest is more or less at the mercy of the organized interest which competes with it. In the United States there is no other class so large, so lacking in cooperative organization, as the farmers, and therefore so little able to meet on equal terms the buyers of its products or the sellers of the supplies it requires.

Instructive examples of agricultural cooperation among irrigators are to be found among the fruit growers of California and elsewhere, and may well serve as object lessons to others engaged in the development and cultivation of irrigated lands. The practice of cooperation is peculiarly adapted to irrigation farming, because irrigators, each cultivating a comparatively small area of land, live in more closely settled communities than dry farmers, and because their products are peculiarly adapted to standardization, as is well shown in the citrus and other cooperative fruit growers' associations mentioned above.

Rural credit.—There is another form of agricultural cooperation of special interest and importance to settlers under irrigation projects, namely, that of cooperative credit, the idea of which is the use of the combined credit of a group of irrigators for the purpose of securing necessary supplies of working capital for each member of the group. In this, as in all other cooperative matters, a distinction must be made between the so-called cooperative organizations the voting control of which is based on stock ownership and those which are truly cooperative and are based on the principles of one man one vote.

In the first a return upon capital is necessarily the principal object; in the second the welfare of the members of the cooperative organization.

In this connection the need of a separate system of banking for farmers has been brought out in a recent address by Hon. Harvie Jordan, of Atlanta, Ga., member of the United States Commission and the American Commission for the Study of Rural Credits in European Countries. Mr. Jordan says:

> The great masses of American farmers market their products but once a year; hence short-time loans as applied to the business of commerce are of but little value to those engaged in agriculture.
>
> Banks engaged in the commercial business of short-time deposits and short-time loans can not supply the needs of the producers of the soil. We need a separate and distinct system of banking for farmers, a system which will secure loans upon long time at a low rate of interest and with a gradual repayment of the principal.
>
> The best agricultural countries in Europe realized the importance and necessity of inaugurating an independent system of banking for the farmers, and for the past half century these purely agricultural banks have provided financial facilities for foreign farmers which would never have been possible with commercial banks.
>
> Wherever these rural banking systems have been inaugurated the business of agriculture has been industrialized and made highly prosperous and successful. Lands have doubled and trebled in value; the yield of crops has multiplied in quantity; the lands are better tilled and fertilized; former tenants are rapidly becoming landlords; cooperative buying and marketing societies have been organized on strictly business lines; the middleman has been entirely displaced; and the producers have won success in the economic distribution of their products from the farm to the retailer or consumer.

The adoption of these rural banking systems has not only had the effect of emancipating the foreign farmers from the grip of the usurer and domination of the middleman, but it has had the further most commendable effect of raising the price of farm products to the producers while relatively lowering prices to the consumers.

The system of rural credit in Europe is outlined by Mr. Jordan as follows:

In Europe land-mortgage banks provide all the facilities for supplying landowners with ample capital on long-time loans at a very low rate of interest. The rate of interest is low because the character of security offered is regarded as absolutely safe.

The operation of these land-mortgage banks is simple. Loans are usually granted for a period of 50 years and at 50 per cent of the market value of the lands offered as security.

All loans are made upon the amortization plan of gradual redemption—that is, the payment of a small annuity on the principal each year by the borrower—so that at the end of the period for which the loan is granted the principal as well as the interest is paid in full and the debt canceled.

To illustrate: A landowner with improved farming lands, valued at, say, $10,000, desires a loan for $5,000 for a period of 50 years. The application is filed with the land-mortgage bank operating in that territory, and after inspection, if found satisfactory, the loan is granted and the money paid over to the borrower after a mortgage has been executed to the bank.

The interest rate on the loan is uniformly 4 per cent per annum, the annual amortization payment to gradually pay off the principal in 50 years is one-half of 1 per cent, and the usual charge made by the bank for handling the loan is one-quarter of 1 per cent per annum, which makes a total of 4¾ per cent per annum.

The amortization gradually reduces the principal each year, and thereby correspondingly reduces the amount of interest to be paid.

In some instances these farm loans are made for periods of 20, 40, 60, and 75 years, the table of the amortization payments being regulated to meet the period of the loan.

Against these mortgage loans bonds are issued by the banks which are guaranteed not only by the underlying security of the lands, but the entire assets of the bank.

These land bonds are sold in the markets to all classes of investors, and by law are made as safe for the investment of trust funds as Government bonds.

These land-mortgage banks are prosperous institutions, and our investigations did not disclose the record of a single failure among them in all the countries visited.

Where the Governments furnished the foundation capital for these banks they are nondividend-paying institutions. All the profits which are accumulated go into the reserves and thereby increase the capital for additional loans.

There are likewise joint-stock land-mortgage banks which are very profitable and pay good dividends each year to their stockholders. Hundreds of millions of dollars have been loaned to farmers under this system of financing agriculture, and the commercial banks are not in anywise antagonistic to the land-mortgage banks.

The result of this system of farm finance, based upon long-time loans, low rates of interest, and amortization, with land as security, has been to revolutionize agriculture in European countries, and has placed the business of farming upon a modern, progressive, and profitable basis.

Cattle on the farm.—One of the items of cooperative work that has been undertaken in an indirect way, at least, has been to try to get the irrigator to appreciate the need of keeping domestic animals and to aid in the procuring of these. It is coming to be more commonly understood that the maintenance of the fertility of irrigated land is dependent largely upon the fertilization resulting from feeding forage on the farm and returning the manure to the soil.

It is obviously impracticable for the Government to go into this matter directly, but by calling to the attention of merchants and

bankers the importance of the subject, it has been possible to arrange cooperation with the State and Federal veterinarians by which their services have been secured in the inspection and purchase of high-grade cattle, the title to these remaining usually in the bankers or others advancing the money, and payment made gradually in small amounts. In this way on several of the projects good dairy cattle have been secured and the prosperity of the area assured.

Crop returns.—The total value of crops raised in 1912 on the various reclamation projects amounted to $14,479,368, an increase of $1,358,144, or 10.3 per cent, over that of the preceding year. From 1911 to 1912, however, the acreage irrigated and cropped increased from 564,681 to 641,397 acres, or 13.6 per cent, and as a result there is shown a slight decrease in the average value of crops per acre in 1912, as compared with 1911, the figures being $22.60 and $23.30, respectively. This decrease is due mainly to lower prices of farm products during 1912. The effect of large areas of new land on the average value of crops per acre is conspicuously indicated by the statistics for 1910 and 1911. In 1911 the acreage irrigated and cropped showed an increase of nearly 20 per cent over that of 1910, whereas the value of crops increased only slightly over 1 per cent, with a resulting decrease in the average value of crops per acre from $27.50 to $23.30. It is probably also true that part of the decrease noted in the later years is due to a gradual increase in the seeped areas.

The following table shows the comparative acreage of the various crops raised in 1911 and 1912. In 1912, as in the preceding year, the largest proportion of the total acreage is devoted to alfalfa, followed by wheat and spelt, oats, and pasture, these four crops representing 73.1 per cent of the total acreage in 1911 and 66.3 per cent in 1912. Conspicuous increases in acreage, both actual and relative, are shown in the case of barley, sugar beets, Indian corn, hay, potatoes, and miscellaneous.

Comparative acreage of crops, 1911–12 (all projects).

Crops.	1911[1]		1912		Increase.		Decrease.	
	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
Alfalfa	231,987	41.2	243,333	37.1	11,346	4.9		
Alfalfa seed	8,946	1.5	8,188	1.2			758	8.5
Barley	28,320	5.1	40,052	6.1	11,732	41.4		
Beans	1,589	.3	591	.1			998	62.8
Beets (sugar)	8,213	1.5	14,121	2.1	5,908	72.0		
Cane	349	.1	685	.1	336	96.4		
Clover	7,001	1.2	4,914	.8			2,087	29.8
Corn (Indian)	11,999	2.1	21,297	3.3	9,298	77.5		
Corn, Kaffir and milo maize	1,487	.3	4,431	.7	2,944	198.0		
Corn, fodder, and sorghum	1,894	.3	1,431	.2			463	24.5
Cotton	3,606	.6	1,275	.2			2,331	64.6
Flax	2,156	.4	4,193	.6	2,037	94.5		
Fruit (including berries and vineyard)	15,852	2.8	14,917	2.3			935	5.9
Garden (including melons and canteloupes)	7,050	1.3	7,183	1.1	133	1.9		
Hay (excluding alfalfa and clover)	11,537	2.1	31,291	4.8	19,754	171.2		
Oats	55,007	9.8	64,626	9.8	9,619	17.5		
Onions	197	.0	741	.1	544	276.2		
Pasture	47,128	8.4	54,345	8.3	7,217	15.3		

[1] Slight revision of 1911 report to make comparable with data in 1912 report.

Comparative acreage of crops, 1911–12 (all projects)—Continued.

Crops.	1911		1912		Increase.		Decrease.	
	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
Potatoes	14,985	2.7	24,363	3.7	9,378	62.7		
Rye	2,124	.4	1,953	.3			171	8.1
Wheat and spelt	77,376	13.7	72,829	11.1			4,547	5.9
Miscellaneous	23,903	4.2	39,171	6.0	15,268	64.0		
Total (gross)	562,706	100.0	655,930	100.0	93,224	16.6		
Deduction for duplication	10,161		13,402		3,241			
Total (net) cropped	552,545	92.0	642,528	93.0	89,983	18.1		
Alfalfa, new	15,043		30,217		15,174	101.0		
Orchard, new	22,873		31,873		9,000	39.4		
Miscellaneous	16,880		17,309		429	2.5		
Total (gross) not cropped	54,796		79,399		24,603	44.9		
Deduction duplication	6,988		29,852		22,864			
Total (net) not cropped	47,808	8.0	49,547	7.0	1,739	3.6		
Grand total irrigated and cropped	[1]600,353	100.0	[1]692,075	100.0	91,722	15.3		

[1] These figures include the areas for the entire Salt River and Uncompahgre Valleys and for areas under the New York Canal Co. of the Boise project and North Platte Canal & Colonization Co. of the North Platte project. Estimated acreage not directly under canals operated by the Reclamation Service: Salt River, 30,542; Uncompahgre Valley, 20,136; total, 50,678.

Operation and maintenance results.—The following table summarizes the operation and maintenance results from 1909 to 1912:

Comparative summary of operation and maintenance results, 1909–1912.

Items.	1909, 20 projects.	1910, 22 projects.	1911, 23 projects.	1912, 23 projects.
Acreage irrigated:				
Under water-right applications	176,942	208,318	270,459	253,090
Under rental contracts, etc	233,686	256,105	294,222	365,590
Cropped, but not irrigated				22,717
Total	410,628	473,423	564,681	641,397
Acreage for which service could supply water	730,601	917,751	1,015,494	1,193,374
Farms irrigated and cropped	9,503	11,676	13,708	16,554
Water-right applications	3,657	5,325	9,528	9,952
Miles of canals operated	2,993	3,945	4,853	5,744
Total cost of operation	$379,332	$437,488	$449,558	$424,957
Cost of operation per acre irrigable	$0.52	$0.48	$0.44	$0.35
Total cost of maintenance	$557,101	$544,478	$608,680	$671,248
Total cost of maintenance per acre irrigable	$0.76	$0.59	$0.60	$0.56
Total cost of drainage, etc				$417,586
Cost of drainage per acre irrigable				$0.35
Total cost of operation and maintenance	$936,433	$981,966	$1,058,238	[1] $1,513,791
Cost of operation and maintenance per acre irrigable (exclusive of drainage, etc.)	$1.28	$1.07	$1.04	$0.91
Cost of operation and maintenance per acre irrigable (inclusive of drainage, etc.)				$1.26
Total value of crops	$11,920,663	$12,974,639	$13,121,224	[2] $14,479,368
Average value of crops per acre irrigated	$29.10	$27.50	$23.30	$22.60
Population of farms	53,812	63,149	69,638	70,141
Population in towns				129,202
Quantity of water delivered to land in acre-feet	1,523,638	1,635,696	2,079,033	1,991,949
Acre-feet per acre	3.7	3.5	3.7	3.2

[1] Inclusive of drainage, etc.
[2] Value of crops, including entire Salt River Valley and entire Uncompahgre Valley, $16,071,980.

In addition to the value of crops and the value of crops per acre, the two features particularly noticeable are the cost of operation and maintenance per acre irrigable and the ratio between the acreage actually irrigated and that for which the service is prepared to supply water. The cost of operation and maintenance per acre irrigable decreased from 1909 to 1911 from $1.28 to 1.04, but in 1912 increased to $1.26, due for the most part to necessary expenditures for drainage. In 1912 the acreage actually irrigated and cropped amounted to only 53.7 per cent of the acreage for which the service is prepared to supply water, tending, of course, to increase the cost of operation and maintenance per acre, since many miles of canals and numerous structures must be operated and maintained to irrigate effectively only about half the acreage which they are cabable of irrigating. For the acreage actually irrigated the cost per acre was consequently somewhat larger, amounting in 1909 to $2.28; in 1910 to $2.07; in 1911 to $1.88; and in 1912, including drainage, to $2.36.

In the United States the farmers are undoubtedly more progressive than those elsewhere, but still the crop production is not up to a desirable standard. One of the reasons for the apparent small average crop value is that a considerable percentage of the area irrigated has been in wheat, oats, and other cereals, the returns from which are relatively small. The raising of grain for sale in the general markets is usually not profitable, but considerable areas of grain are planted, especially during the first few years, in order to obtain quick returns, or for local use or to aid in securing a stand of alfalfa. Grain is most quickly raised and enables the farmer to get his land subdued and prepared for more profitable crops. The trouble is, however, that many of the farmers continue the raising of grain year after year for different reasons.

On certain of the older projects, such as the Sunnyside unit of the Yakima project in Washington, or in the more recently developed Huntley project in Montana, in both of which a large portion of the land has been fully developed and is on a paying basis, the success and prosperity of the water users can be looked upon as an established fact. It is safe to predict that similar success will be attained on all the projects of the Service where proper methods of agriculture are introduced and the crops best adapted to each project are raised.

Present investment.—The total net cost to June 30, 1913, was $78,754,526.54. This may be considered under two heads, namely, the investment in works which are practically completed, and from which returns are being received, and, second, the investment in portions of the works which can not be utilized until more work is done. Steady progress is being made in finishing portions and making available larger and larger areas for irrigation. The following table gives in concise form many of the items which have been completed, and a more detailed table is given in the appendix, pages 322 to 329:

Summary of results, June 30, 1913.

Lands:	Acres.	Farms.
Area of 28 projects when completed	2,973,048	60,569
Service was prepared to irrigate	1,290,107	26,674

		Acres.	Farms.
Lands—Continued.			
Under contract—			
Water-right application		431,457	8,786
Rental contracts, etc		510,815	12,168
Total under contract to June 30, 1913		942,272	20,954
Estimated irrigated to June 30, 1913		721,410	18,472
Available reservoir capacity	acre-feet	5,051,210	
Canals and ditches:			
Canals over 800 second-feet capacity	miles	313	
Canals, 301–800 second-feet capacity	do	471	
Canals, 50–300 second-feet capacity	do	1,206	
Canals less than 50 second-feet capacity	do	5,538	
Waste-water and drainage ditches	do	433	
Total canals and drainage ditches	do	7,961	
Tunnels: Number, 77; aggregate length, 117,760 feet	do	22¼	
Dams, storage and diversion:			
Masonry	cubic yards	868,176	
Earth	do	7,955,067	
Rock fill and crib	do	700,409	
Total volume of storage and diversion dams	do	9,523,652	
Dikes or levees: Length, 433,684 feet (82 miles)	do	3,697,228	
Canal structures:			
Costing over $2,000; concrete, 576; wood, 51; total		627	
Costing $500–$2,000; concrete, 1,152; wood 178; total		1,330	
Costing $100–$500; concrete, 5,715; wood, 3,475; total		9,210	
Costing less than $100; concrete, 5,044; wood, 34,022; total		39,066	
Total number of canal structures, concrete, 12,487; wood, 37,746; total		50,233	
Bridges:			
Steel, over 50 feet, 43; under 50 feet, 38; total, 81	feet	5,033	
Combination, over 50 feet, 32; under 50 feet, 270; total, 302	do	6,910	
Wood, over 50 feet, 170; under 50 feet, 2,596; total, 2,767	do	56,325	
Concrete, over 50 feet, 12; under 50 feet, 179; total, 191	do	2,632	
Total over 50 feet, 257; under 50 feet, 3,083; total, 3,339	do	70,900	
Culverts:			
Concrete (1,130), length	feet	47,897	
Iron and steel (672), length	do	16,779	
Terra cotta (196), length	do	9,679	
Wood (1,853), length	do	46,080	
Total (3,851), length	do	120,435	
Pipe:			
Concrete	feet	433,212	
Iron and steel	do	32,287	
Terra cotta	do	181,339	
Wood	do	184,149	
Total 157 miles	do	830,987	
Flumes:			
Concrete, number, 28; length	feet	3,039	
Metal, number, 238; length	do	74,712	
Wood, number, 1,171; length	do	323,640	
Total number 1,437 (76 miles); length	do	401,391	

Buildings:		
Offices		65
Residences		426
Power plants		14
Pumping stations		61
Barns, storehouses, etc		332
Total		898
Wells:		
Number		348
Aggregate depth	feet	26,237
Communications:		
Roads	miles	697
Railroads	do	51
Telephones (phones, 927)	do	2,331
Transmission lines	do	351
Water power developed:		
26,866 horsepower; including steam	horsepower	32,466
Excavation:		
Class 1, earth	cubic yards	87,492,753
Class 2, indurated material	do	6,296,118
Class 3, rock	do	5,456,897
Total	do	99,245,768
Coal mined	tons	30,693
Riprap placed	cubic yards	419,790
Paving placed	square yards	511,322
Concrete placed	cubic yards	1,344,908
Cement used (338,452 barrels manufactured by United States)	barrels	1,533,544
Sand cement (manufactured by United States, 3 plants in operation)	barrels	95,435

General data.—The following table presents general data regarding the various projects:

General data regarding projects.

[For details of the revenues and adjustments, see Table 20, "Cost adjustments and revenues credits in the appendix."]

State and project.	Gross cost.				Revenues and adjustments.			
	Building.		Operation and maintenance.		Building.		Operation and maintenance.	
	Fiscal year 1913.	To date.	Fiscal year 1913.	To date.	Fiscal year 1913.	To date.[1]	Fiscal year 1913.	To date.
Arizona, Salt River	$647,042.54	$11,193,686.86			$187,742.68	$1,225,555.88		
Arizona-California, Yuma	465,201.89	6,307,890.79	$59,032.70	$127,762.09	71,973.70	254,277.72	$12,536.00	$50,645.00
California, Orland	32,653.51	600,207.46			16,999.82	39,742.98		
Colorado:								
Grand Valley	189,609.23	455,070.87			2,356.13	2,061.43		
Uncompahgre	284,728.55	5,227,301.24			52,874.60	229,796.29		
Idaho:								
Boise	1,279,071.75	8,132,831.12			114,603.99	322,039.43		
Minidoka	201,082.24	4,448,931.57	266,003.09	787,507.99	[2] 28,036.49	50,439.15	246,025.01	437,835.75
Kansas, Garden City	[2] 327.13	388,256.76			50.68	9,670.71		
Montana:								
Huntley	49,300.44	967,334.99	62,908.15	243,121.04	11.48	9,493.74	22,228.43	65,523.84
Milk River	640,781.05	1,600,120.01			9,257.17	9,805.21		
Sun River	125,508.46	987,210.94	13,997.50	56,379.33	11,614.80	25,342.56	10,490.40	34,494.37
Montana-North Dakota, Lower Yellowstone	12,781.50	2,785,478.63	72,027.79	380,522.61	546.18	23,706.83	96,657.28	125,479.72
Nebraska-Wyoming, North Platte	385,953.30	5,916,247.65	70,202.10	214,589.12	4,391.13	44,908.25	35,041.07	273,383.43
Nevada, Truckee-Carson	454,587.53	5,043,903.46	52,354.95	273,103.86	15,505.33	45,544.83	33,950.80	126,757.13
New Mexico:								
Carlsbad	30,558.18	836,705.13	26,760.31	102,959.40	1,081.09	10,759.83	21,312.27	102,968.62
Hondo	5,550.44	364,163.80			1,027.70	5,888.99		
New Mexico-Texas, Rio Grande	956,751.81	2,094,578.84			44,337.55	100,771.50		
North Dakota, North Dakota pumping		712,856.78	58,968.25	231,148.48	5,402.11	7,396.04	14,592.87	47,593.29
Oregon, Umatilla	88,061.26	1,434,377.98	29,822.46	153,445.86	16,223.24	19,869.98	18,122.03	69,824.65
Oregon-California, Klamath	132,518.87	2,324,219.89	24,024.51	127,204.07	368.73	37,849.60	19,628.25	102,753.00
South Dakota, Bellefourche	[2] 18,303.36	3,140,869.36	58,392.66	183,792.51	[2] 16,117.17	10,483.49	32,189.02	100,764.25
Utah, Strawberry Valley	381,828.93	2,287,212.68			19,074.17	81,896.18		
Washington:								
Okanogan	39,935.86	631,594.68	12,345.65	54,946.99	3,003.18	3,073.17	25,414.75	86,412.37
Yakima, storage		882,833.02				56,496.04		
Yakima, Sunnyside		2,382,827.84	66,256.68	442,693.11		35,963.46	114,932.91	439,395.83
Yakima, Tieton	356,403.91	3,028,369.72	41,215.75	83,756.83	2,584.36	23,204.98		92,205.78
Wyoming, Shoshone	[2] 15,276.27	3,771,561.78	194,591.01	312,577.23	47,074.17	61,525.65	13,981.36	71,493.44

[1] For details of sources of these revenues and adjustments, see table "Cost adjustments and revenue credits."
[2] Deduct.

General data regarding projects—Continued.

[For details of the revenues and adjustments, see Table 20, "Cost adjustments and revenues credits in the appendix."]

State and project.	Gross cost.				Revenues and adjustments.			
	Building.		Operation and maintenance.		Building.		Operation and maintenance.	
	Fiscal year 1913.	To date.	Fiscal year 1913.	To date.	Fiscal year 1913.	To date.	Fiscal year 1913.	To date.
Montana:								
Blackfeet	$166,663.04	$763,122.17			$9,306.90	$28,033.08		
Flathead	176,180.46	1,122,801.93			3,821.29	33,915.46		
Fort Peck	75,857.31	272,759.18			2,425.87	6,839.30		
Jackson Lake, enlargement	13,216.27	13,216.27			9.57	9.57		
General accounts	264,047.27	[1] 1,907.86			261,486.54	[1] 1,906.13		
Secondary projects	[2] 54,927.33	754,937.97						
Town-site development	1,238.19	16,916.04						
Preliminary investigation	[3] 80,488.73	80,488.73						
Total	7,558,623.09	81,572,794.00	$1,108,903.56	$3,775,510.52	861,000.50	2,818,267.46	$717,102.45	$2,227,530.47

State and project.	Net cost.				Number of acres in completed projects.	Area for which water is available June 30, 1913.	Area under water-right applications and rental contracts to June 30, 1913.
	Building.		Operation and maintenance.				
	Fiscal year 1913.	To date.	Fiscal year 1913	To date.			
Arizona, Salt River	$459,299.86	$9,968,130.98			230,000	180,000	190,000
Arizona-California, Yuma	393,228.19	6,053,613.07	$46,496.70	$77,117.09	131,000	50,000	25,850
California, Orland	15,653.69	560,464.48			14,307	14,307	6,122
Colorado:							
Grand Valley	187,253.10	453,009.44			53,000		
Uncompahgre	231,853.95	4,997,504.95			140,000	44,000	44,000

Idaho:							
Boise	1,164,467.76	7,810,791.69			207,000	207,000	82,250
Minidoka	229,118.73	4,398,492.42	19,978.08	349,672.24	118,025	115,600	99,700
Kansas, Garden City	[4] 377.81	378,586.05			10,677		
Montana:							
Huntley	49,288.96	957,841.25	40,679.72	177,597.20	32,405	28,805	24,188
Milk River	631,523.88	1,590,314.80			219,557	12,800	3,240
Sun River	113,893.66	961,868.38	3,507.10	21,884.96	216,346	16,346	10,948
Montana-North Dakota, Lower Yellowstone	12,235.32	2,761,771.80	[4] 24,629.49	255,042.89	60,116	37,799	29,737
Nebraska-Wyoming, North Platte	381,562.17	5,871,339.40	35,161.03	[4] 58,794.31	129,270	109,500	89,121
Nevada, Truckee-Carson	439,082.20	4,998,358.63	18,404.15	146,346.73	206,000	52,039	44,616
New Mexico:							
Carlsbad	29,477.09	825,945.30	5,448.04	[4] 9.22	20,277	20,277	20,277
Hondo	4,522.74	358,274.81			10,000		2,305
New Mexico-Texas, Rio Grande	912,414.26	2,593,807.34			155,000	37,000	34,115
North Dakota, North Dakota pumping	[4] 5,402.11	705,460.74	44,375.38	183,555.19	26,314	12,107	6,825
Oregon, Umatilla	71,838.02	1,414,508.00	11,700.43	83,621.21	25,000	18,300	14,114
Oregon-California, Klamath	132,150.14	2,286,370.29	4,396.26	24,451.07	70,700	29,700	29,750
South Dakota, Bellefourche	[4] 2,186.19	3,130,385.87	26,203.64	83,028.26	100,000	65,852	46,894
Utah, Strawberry Valley	362,754.76	2,205,316.50			60,000		
Washington:							
Okanogan	36,932.68	628,521.51	[4] 13,069.10	[4] 31,465.38	10,071	10,071	8,357
Yakima, storage		826,336.98					
Yakima, Sunnyside		2,346,864.38	[4] 7,460.48	3,297.28	102,824	80,608	70,722
Yakima, Tieton	353,819.55	3,005,164.74		[4] 8,448.95	34,537	34,537	23,225
Wyoming, Shoshone	[4] 62,350.44	3,710,036.13	180,609.65	241,083.79	164,122	41,310	23,792
Montana:							
Blackfeet	157,356.14	735,089.09			122,500	26,649	
Flathead	172,359.17	1,088,886.47			152,000	38,000	11,444
Fort Peck	73,431.44	265,919.88			152,000	7,500	680
Jackson Lake, enlargement	13,206.70	13,206.70					
General accounts	[1] 2,560.73	[1] 1.73					
Secondary projects	[2] 54,927.33	754,937.97					
Town-site development	1,238.19	16,916.04					
Preliminary investigation	[3] 80,488.73	80,488.73					
Total	6,697,622.59	78,754,526.54	391,801.11	1,547,980.05	[5] 2,973,048	[5] 1,290,107	942,272

[1] As "General accounts" is a clearing account the total to date figures are not significant. They are brought in here simply to preserve the balance of the table.
[2] The amount entered in columns "Fiscal year 1913" does not represent expenditures in the year 1913. This amount was heretofore carried as primary projects, but during the last year the amounts were transferred to "Secondary projects" account.
[3] This amount was heretofore included as a part of the cost of primary projects, but was deducted from those amounts and given a separate title during the year. It does not represent expenditures in 1913.
[4] Deduct.
[5] Inclusive of Gila Indian lands, 10,000 acres.

DRAINAGE.

The rise of the water table and tendency toward water logging and seepage of lands, except where protected by drainage works, has continued over portions of most of the projects during the past year. In some cases this rise has been sufficient to render the land unproductive and unfit for cultivation. In others it is sufficiently high to threaten the irrigability of the land at an early date if not controlled. In a few instances the water plane has fallen during the year. These cases are generally confined to small areas, and the lowering of the water plane over them generally appears to be the result of the use of less water in the vicinity for irrigation. Field investigations and studies of the rise of ground water lead to the conclusion that it is due both to excess use of water in irrigation and to unavoidable losses from earthen canals. How much each of these causes contributes it is generally impossible to determine. In some individual cases, where small areas are involved, the source of seepage water can be directly traced.

The excess water of irrigation which contributes most largely to seepage is what may be termed underground waste. It is caused by applying more water to the surface at a single irrigation than the soils can retain within the zone of plant growth. A part of it consequently sinks into the lower and more porous soil strata. Gradually the subsoils become filled to an extent that water is brought to the surface on the low areas or on the lower portion of slopes down which the ground water may be slowly percolating. The economical remedy against seepage of this kind is to reduce the amount of water applied to the soil at any one time to that which it can retain and beneficially use for the growing of plants. This requires careful preparation of the land for irrigation as well as careful handling of the water. Especial attention must be given to the use of heads large enough to go over the land quickly and before an excessive amount is allowed to sink into the soils. Reducing the underground waste in irrigation will reduce the amount of drainage required and also make it more easily possible to determine the location of losses from canals and to provide against them in an economical manner. In cases where seepage is evidently caused by losses from canals, consideration is now being given to lining or otherwise making the canals water tight.

In order to reduce the amount of drainage that will be required to a minimum too great attention can not be given to the economic use of water. The ample water supply furnished by the service, the unfavorable conditions of many of the lands for economic distribution of water, and the lack of experience in irrigation of many of the settlers are all factors directly affecting seepage and drainage. Until the processes of irrigation are perfected to an extent that it can be carried on without excessive underground waste, and until excessive losses from canals can be reduced, extensive drainage works will undoubtedly be required to maintain the irrigability of portions of the lands. If these works are not provided, large areas will become unfit for cultivation through being water-logged and, in most cases, eventually become alkaline through capillary action and surface evaporation. Drains, to be effective in protecting land against seepage and becoming alkaline, must be deep enough to hold the water plane below the depth from which any considerable amount of water

can reach the surface through capillary action. They must also be excavated into the more porous or water-bearing materials. Closed drains, as a rule, are more effective than open ones. This is due largely to the possibility of maintaining a closed drain in working condition at all times and its consequent efficiency in holding down the water plane. With open drains there is a constant tendency to filling above the grade, due to obstructions which enter them. For this reason closed drains are favored except where the quantity of water to be removed is too great or the slopes too flat to make them practicable.

During the year 1912–13 drainage studies and investigations were carried on over 17 of the projects. On some of these—namely, Yuma, Boise, Minidoka, North Platte, Klamath, and Shoshone—the work of constructing drains for the relief of wet areas was in progress. On the Sun River, Lower Yellowstone, Truckee-Carson, and Carlsbad projects plans were prepared for drains intended for the relief of the most seriously affected areas. On the Salt River, Rio Grande, Belle Fourche, Strawberry Valley, and Uncompahgre Valley projects investigations of seepage conditions were begun. On the last-named projects the rise of ground water has been sufficient to threaten portions of the irrigable area, and the investigations which have been begun are for the purpose of collecting the necessary data for planning drainage works when required. The amount expended on drainage construction during the year 1912–13 is estimated at about $300,000. The amount required for this work during the year 1913–14, in order to afford relief to lands that are already wet and to prevent seepage spreading to adjacent areas, is estimated at from $300,000 to $400,000.

It is the intention to so locate drains on the various projects that they will serve as main outlets and also provide for holding down the water plane and affording protection to as large an area as is possible. The value of these drains as protection measures for land not yet seeped is, in many cases, it is believed, as great or greater than their value for reclaiming areas already too wet for cultivation. It is sometimes the case, especially where a small area requires drainage, that the cost of adequate works is as much or even more than the value of the land over which seepage has occurred. Careful consideration must, then, be given to determine whether expenditures for drainage are justified from a financial viewpoint. Cases of this kind are frequently difficult of solution, on account of the indirect benefits which may be derived from drainage works. There is frequently involved more than the question whether the land which is now wet will, when reclaimed, be worth the cost of reclaiming it. The value of the works in protecting other lands not yet affected, the benefits to other settlers of having objectionable wet areas eliminated, and the saving, outside of mere land values, to the individual settlers who may be required to abandon their farm units because they are too wet for cultivation must all be considered. A relatively small area of wet land, on account of its location, may be a source of serious damage to several individual farm units. It may even make the cultivation of the remaining portions of them impracticable. In such a case the value of drainage is not the value of the actual wet lands when reclaimed, but the value of the entire area involved.

SECONDARY PROJECTS.

In addition to the primary irrigation projects which have been approved by the Secretary of the Interior for detailed investigation or for construction, and which are discussed on pages 50 to 262, a number of secondary projects have been investigated at various times since the organization of the Reclamation Service. The work on the secondary projects has in general been limited to the gathering of information as to water supply and the determination of the character and extent of irrigable lands.

The following secondary projects have been investigated:

Arizona: Little Colorado, San Carlos, and San Pedro.

Arizona-California: Colorado River.

California: Owens Valley, Sacramento Valley, and San Joaquin.

Colorado: White River.

Idaho: Dubois and Port Neuf.

Montana: Clark Fork, Crow Reservation, Lake Basin, Madison River, and Marias.

Nebraska: South Platte.

Nevada: Walker River.

New Mexico: La Plata, Las Vegas, and Urton Lake.

North Dakota: Bismarck, Little Missouri, Nesson, Washburn, and Bowman.

Oklahoma: Cimarron and Red River.

Oregon: Malheur and Central Oregon.

Utah: Bear Lake and Utah Lake.

Washington: Palouse, Priest Rapids, Wapato, Benton, and Kittitas.

Wyoming: De Smet.

Information relative to these projects can be found in preceding reports by consulting the index in the Tenth Annual Report.

LEGISLATION.

The reclamation act and acts of Congress affecting the operations thereunder have been printed in preceding annual reports from the fifth to the eleventh, inclusive. For convenience of reference the reclamation act is reprinted in the Appendix, page 263, together with laws affecting operations thereunder that have not heretofore been printed in the annual reports.

DECISIONS OF THE SECRETARY OF THE INTERIOR.

Below is given, under suitable headings, a digest of important decisions which have been rendered by the Secretary of the Interior during the past year, relative to operations under the reclamation act. A few decisions by the comptroller are also included.

AMENDMENT OF FARM UNIT—CREDITS FOR PAYMENTS MADE.

Where after entry of a reclamation farm unit the farm unit plat is amended, and the entryman in conforming his entry to the amended plat retains only part of the land originally entered, he is entitled to have the payments theretofore made on account of the building charge, and on account of the Indian price for the land, if

within a former Indian reservation, credited to the retained portion, but is not entitled to have the payment made on account of operation and maintenance so credited. (First Assistant Secretary, Oct. 29, 1912; 41 L. D., 389.)

APPROPRIATION OF WATER.

Under the Colorado laws a prior appropriation of water gives the appropriator a right to only so much of the natural flow of the river as is applied by him to beneficial use, and does not entitle him to have the natural flow of the river maintained in order that the amount of water appropriated by him shall continue available under the particular method adopted to carry it to the land upon which it is used. So long as sufficient water is left in the river to meet all prior appropriations and beneficial use the prior appropriator can not lawfully or equitably complain of the diversion of other waters of the river through appropriation and beneficial use, if it is thought such appropriation and diversion would so lower the level of the river as to necessitate the adoption of other methods of transferring the water appropriated from the river to the land upon which it is used. (First Assistant Secretary, Nov. 2, 1912; 41 L. D., 399.)

ASSIGNMENTS.

A wife of an entryman of lands within a reclamation project is not qualified to take an assignment of part of her husband's entry under the provisions of the act of June 23, 1910. (First Assistant Secretary, Oct. 30, 1912; 41 L. D., 428.)

The act of June 23, 1910 (36 Stat., 592), authorizing the assignment of parts of reclamation homestead entries has no application to entries which prior to that act had been adjusted to farm units and canceled as to the residue after due notice, and an attempted assignment under that act of land so eliminated as residue is without authority of law and can not be recognized. (First Assistant Secretary, Nov. 6, 1912; 41 L. D., 394.)

CONTEST.

A successful contestant in exercising his preference right of entry upon lands within a reclamation project is limited to one farm unit, although such unit may embrace less than the area covered by the contested entry; and section 5 of the act of June 25, 1910, has the effect to postpone the exercise of such right of entry until the project is so far completed that water can be supplied to the land, and the Secretary of the Interior has made public announcement of that fact. (First Assistant Secretary, Aug. 16, 1912; 41 L. D., 286; see also 41 L. D., 326.)

Where after the initiation of a contest against a homestead entry the lands are included within a first form withdrawal under the reclamation act, but are subsequently relieved from the withdrawal and restored to entry, the contestant, upon the successful termination of the contest subsequent to the order of restoration, is entitled to exercise his preference right of entry for the land. (Assistant Secretary, May 27, 1913; 42 L. D., 172.)

DESERT ENTRY WITHIN PROJECT LIMITS.

Section 5 of the act of June 27, 1906 (34 Stat., 519), authorizing an extension of time for compliance with law on desert entries within reclamation projects, applies only to entrymen who have been directly or indirectly delayed or prevented from carrying out their plans and works for obtaining a water-supply by the creation of a reclamation project. (First Assistant Secretary, Oct. 10, 1912; 41 L. D., 377.)

ISSUANCE OF FINAL CERTIFICATE.

The fact that remunerative crops may be raised without irrigation upon land lying within a reclamation project is not sufficient ground for exclusion of such land from the project, and final certificate will not issue upon an entry embracing such land until all sums due the United States under the reclamation act on account of land or water right at the time of issuance of the certificate shall have been paid. (Assistant Secretary, Mar. 18, 1913; 42 L. D., 8.)

HOMESTEAD ENTRY, FLATHEAD PROJECT.

A homestead entry made under the act of April 23, 1904, as amended by act of May 29, 1909, providing for entry of lands within the Flathead project, Montana, may be commuted, under section 2301, Revised Statutes, upon payment of the appraised price of the land; but, as the entryman under said acts is required in addition to compliance with the general homestead laws to reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and to pay the water-right charges apportioned against the tract, final certificate should not issue until the land has been reclaimed and the charges apportioned and paid in accordance with the provisions of the said acts. (First Assistant Secretary, Jan. 31, 1913; 41 L. D., 521.)

INSANE ENTRYMEN.

The equitable title which vests in a homestead entryman under the act of June 8, 1880, upon his becoming insane is subject, where the land lies within a reclamation project, to the provisions of the reclamation act, and upon the establishment of farm units patent can issue to him for only one of the farm units formed from his entry, the remaining units being subject to assignment under the act of June 23, 1910, by his legal guardian, duly authorized to act for him during his mental disability. (First Assistant Secretary, Mar. 12, 1913; 41 L. D., 634.)

LANDS AFFECTED BY ALKALI.

Lands too alkaline to produce profitable crops may be supplied with water for a nominal rental, in order to encourage washing the alkali from the soil. (Assistant Secretary, Mar. 24, 1913.)

OFFERING A REWARD.

There is no objection to the offering of a reward leading to the conviction of any person willfully damaging or interfering with any

telephone line, or any part thereof, operated by the United States; and payment of the reward so offered would be authorized when satisfactory proof of the earning thereof has been presented. (Comptroller, Mar. 7, 1913.)

PAYMENT OF DAMAGES.

In the absence of express legislative authority, payment can not be made of a claim for unliquidated damages caused to the hay crop and garden of a settler by the operations of the Reclamation Service. (Comptroller, Feb. 15, 1913.)

PROCEEDS OF LEASES FOR PUBLIC LANDS.

In view of the decision of the Supreme Court in United States *v.* Gratiot (14 Pet., 526), there can be no doubt that a lease is a "disposal" of lands, as contemplated by section 1 of the reclamation act. The said section appropriates "all moneys received from the sale and disposal of public lands" in certain States "except the 5 per centum of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes." The full 100 per cent of the proceeds of the lease is appropriated, without deduction, to the reclamation fund by section 1 of the reclamation act. (Acting secretary to Commissioner, General Land Office, Aug. 31, 1912, case of Owl Creek Coal Co., Wyoming.)

REINSTATEMENT FOR PURPOSE OF ASSIGNMENT.

Where a homestead entry within a reclamation project was, after the submission of final proof, conformed to a farm unit and cancelled on relinquishment as to the remainder prior to the act of June 23, 1910, the entry will not be reinstated as to the canceled portion for the purpose of permitting the entryman to assign such portion under the provisions of that act. (Assistant Secretary, May 7, 1913, 42 L. D., 157.)

RELINQUISHMENT OF RECLAMATION ENTRIES.

The act of February 18, 1911, provides that where entries made prior to June 25, 1910, embracing lands within a reclamation project have been or may be relinquished in whole or in part, the lands so relinquished shall be subject to settlement and entry under the homestead law as modified by the reclamation act. Such provision is applicable only to entries under the reclamation act and can not be invoked as to entries canceled prior to the date of the reclamation act or made before and afterwards canceled for fraud. (Assistant Secretary, Mar. 17, 1913; 42 L. D., 7.)

WATER RIGHTS FOR CORPORATIONS.

Congress did not intend the reclaimed lands to be the subject of corporate control. Those corporations which are in existence, to which water rights have been granted, should be allowed to continue without interference, and in view of past decisions it may be the wisest policy to grant to corporations which have at this time made

applications such right. No more such applications should be allowed; and this should be the rule of the department. (Secretary, July 11, 1913.)

WITHDRAWAL.

Settlement, residence, and improvement upon a tract of unsurveyed public land confer no such right upon the settler as will prevent withdrawal thereof by the Government for public purposes. An applicant may be compensated only to the extent of the value of improvements which had been placed on the land prior to the notice of withdrawal. (Assistant Secretary, Mar. 19, 1913; 41 L. D., 627.)

PUBLIC NOTICES AND ORDERS.

During the fiscal year ending June 30, 1913, 22 formal public notices and orders were issued by the Secretary of the Interior for the purpose of opening various areas to entry and regulating water-right charges and other matters in connection with the operation of the different projects. The public notices issued are printed in the discussions of the individual projects. In addition the following orders and public notice relating to all projects were issued:

ORDER DATED OCTOBER 3, 1912.

A number of cases having occurred where in operations under the reclamation act the United States has been subjected to expense in compensating settlers who have located upon and improved lands withdrawn under the reclamation act, notwithstanding the prior withdrawal, it is hereby ordered that—

(1) Whenever knowledge is acquired by any engineer or employee of the Reclamation Service that any person has settled upon lands withdrawn under the first form, or upon lands withdrawn under the second form, before they have been declared subject to entry, and after such withdrawal, written notice be served upon the settler to the effect that the land is not subject to settlement, and that no preference right can be acquired thereby in the event of the future opening of the land to entry.

(2) Where a settler is preparing to make improvements or expenditures upon withdrawn land needed or likely to be needed for reclamation work, or where settlement or occupation interferes or is likely to interfere with the operations of the Service, the notice served shall contain information to the effect that the occupation is illegal, and that unless the entryman promptly vacates the land, or shows cause as to why he should not do so, proper steps will be taken in the courts to secure his removal. Notices provided for in paragraphs 1 and 2 should be limited to statements in substantially the language indicated.

(3) If after service of notice to vacate, the entryman does not, within a reasonable time comply with the notice, the engineer shall at once report all facts to the Director of the Reclamation Service, through the supervising engineer in charge of the district embracing the project, the report to contain sufficient information to form basis of appropriate legal action.

(4) Copies of notices served by engineers or employees in pursuance of this order will be at once furnished to the local land office and to the Director of the Reclamation Service, through the office of the supervising engineer.

SAMUEL ADAMS, *Acting Secretary.*

ORDER DATED FEBRUARY 26, 1913.

The engineers of the Reclamation Service are hereby authorized to deliver water to any water user without payment of the portions of the installment on account of operation and maintenance, as required by public notices and orders heretofore issued and pending action by the Supreme Court of the United States, upon the condition that the water user shall promptly pay all portions

of the installments for operation and maintenance which should have been paid under such public notices and orders before the furnishing of water, unless the Supreme Court in the case now pending renders such judgment as to prevent the Secretary of the Interior from collecting said installments for operation and maintenance.

In case of failure of any water user to make payment as provided above within 10 days after public notice of decision by the Supreme Court of the United States in the case above noted, the water supply for his land shall be promptly shut off and so remain until payment has been made of said charges, and also of any other charges due at that time in excess of one full installment of the charges for building, operation, and maintenance.

The shutting off of water hereunder shall not preclude the United States from following any other remedy which may be available to it.

The furnishing of water hereunder is not to be considered as in any way relieving the water user from any other payments required by the public notices and orders in the time and manner therein specified.

This order applies only to the charges on account of operation and maintenance as required by public notices and orders. It does not apply to water rental or water carriage charges, and no water shall be furnished in such cases unless the payments required by contract or order are duly made.

WALTER L. FISHER, *Secretary.*

PUBLIC NOTICE DATED JUNE 23, 1913.

1. On February 26, 1913, the Secretary of the Interior, acting under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, issued an order suspending for the time being the requirement that no water would be furnished under the several projects as provided by existing public notices and orders until payment had been made of the charges for operation and maintenance.

2. This order was issued because of the pendency in the United States Supreme Court of the case of Swigart *v.* Baker, in which was called in question the right of the Secretary of the Interior to collect charges for operation and maintenance under the terms of the said acts.

3. Said order provided that in case the United States Supreme Court sustains the authority of the Secretary to require such payments, the water user shall make prompt payment of the portions of installments for operation and maintenance which should have been paid under public notices and orders before the furnishing of water, and in case of failure of any water user to make such payment within 10 days after public notice of a decision of the Supreme Court of the United States in said case sustaining the right to make such collections, the water supply for his land shall be promptly shut off and so remain until payment has been made of said charges.

4. On May 26, 1913, the Supreme Court of the United States decided the case of Swigart *v.* Baker, holding that the Secretary of the Interior was authorized by the law to require payment of the charges for operation and maintenance.

5. Notice is accordingly hereby given that the charges for operation and maintenance on every project shall be paid as required by the public notices and orders issued thereunder, and in case of failure to make such payment on or before July 21, 1913, such action shall be taken in each case as is provided by law and by the public notices and orders applicable to the project.

6. The said date of July 21, 1913, hereby fixed is intended to give not less than 10 days' notice from the date of publication of this order in some newspaper of local circulation on each project affected.

7. The building charge on the several projects due December 1, 1912, or March 1, 1913, April 1, 1913, or May 1, 1913, as the case may be, is hereby reduced to one-third of the amount due on the said dates (taking the nearest tenth of a dollar), but not less than 50 cents per acre, subject to the conditions hereafter stated. The remainder of such installment of said building charge shall in each case be added to the last installment due under the corresponding water-right application.

8. All water-right applicants who have already paid the building charge due December 1, 1912, or March 1, 1913, April 1, 1913, or May 1, 1913, as the case may be, shall be credited with payment made in excess of the amount herein provided, to be applied on their next unpaid annual building charge or they

may have the credit applied to the charges for operation and maintenance now due.

9. No water-right applicant shall be entitled to the above reduction in the building charge unless he has paid the charges for operation and maintenance now due and has prepared for irrigation and has irrigated in good faith for the purpose of raising agricultural crops one-half the entire irrigable area of his tract or not less than five acres for each full irrigation season since water was available therefor.

10. As a matter of further relief to the water user who is delinquent in his payments to such extent as to be subject to cancellation, it is hereby ordered that no proceedings looking toward cancellation will be taken before December 1, 1913, on account of said delinquency; provided that the said water user has paid the charges for operation and maintenance now due and has prepared his land for irrigation and has irrigated to the extent described in the preceding paragraph.

FRANKLIN K. LANE.

LITIGATION.

COLORADO, GRAND VALLEY PROJECT.

On July 22, 1912, Judge Cavender, of the State district court, entered the decree reported by the referee in the proceedings to adjudicate the priorities of water rights in water district No. 42, State of Colorado (mentioned in the Tenth and Eleventh Annual Reports). The project is given a conditional decree as of February 27, 1908. On request, the United States was allowed 60 days within which to file its bill of exceptions to the decree. On September 19, 1912, the United States district attorney filed such bill.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

A suit for the adjudication of water rights in water district No. 40, State of Colorado, which has been pending before the district court of Delta County, Colo., for the past three years, was closed, so far as the United States is concerned, on June 24, 1913, when Judge Black, of said district court, entered a decree giving to the United States a decree for 1,300 cubic feet of water per second of time from the Gunnison River and its tributaries of date June 1, 1901. Certain other claimants who appeared in the proceedings objected to said decree to the United States, and were given 90 days in which to appeal. Said proceedings have been left open, however, as to several small ditches, for the purpose of allowing a further showing to be made as to their claims to the use of water.

The suit for the adjudication of water rights in water district No. 62, State of Colorado, which has been pending before the district court of Montrose County, Colo., since April 25, 1910, was finally closed on May 8, 1913, when Judge Cavender entered a decree setting forth the rights of the various claimants who appeared in the proceedings to the use of water. In this adjudication a decree was given to the United States in connection with the Uncompahgre Valley project for 1,300 cubic feet of water per second of time from the Gunnison River and its tributaries of date June 1, 1901.

On March 17, 1911, condemnation proceedings were commenced in the United States District Court for the District of Colorado against Aylmer F. Reeves to secure a strip of land for canal right of way across the NW. ¼ SE. ¼ sec. 21, T. 49 N., R. 10 W., N.M.P.M.,

for the King lateral extension ditch. This suit never came to trial, but was allowed to go over from time to time with consent of counsel, for the reason that negotiations for settlement were under way. A basis of settlement has been agreed upon between the defendant and the United States attorney. The case will not be dismissed, however, until compensation has been paid and judgment by stipulation has been entered.

On April 20, 1912, condemnation proceedings were commenced in the United States District Court for the District of Colorado against Jesse O'Neill and James O'Neill to secure a parcel of land for canal right of way in sec. 23, T. 49 N., R. 10 W., N.M.P.M., for the Spring Creek lateral. On May 3, 1912, the defendants filed their answer and asked for the appointment by the court of a commission to determine the necessity for the taking of the right of way in controversy. On June 15, 1912, a reply to the answer of the defendants was filed on behalf of the United States. On June 26, 1912, a hearing was had at Denver, Colo., at which the questions of the right of the defendants to have a commission appointed for the purpose of determining the necessity for the taking of the right of way involved and the right of the United States to take immediate possession were argued. The court took the matter under advisement, and on August 19, 1912, found for the United States, since which time no further action has been taken in said suit, as settlement was effected with the defendants out of court. The suit will not be dismissed, however, until deed has passed to the United States.

On April 25, 1912, an injunction suit was commenced in the United States District Court for the District of Colorado by the United States against John A. Masters, Martin Van Horn, and other defendants to restrain them from interfering with the construction of the West Canal across the lands of defendants on the route selected for said canal under the provisions of the act of August 30, 1890. On the same date the court granted a temporary restraining order. A hearing was had on May 17, 1912, and on June 12, 1912, opinion was rendered sustaining the validity of the reservation and ordering that a temporary injunction be issued until final hearing. On September 12, 1912, another hearing was had in which the defendants sought to have the temporary injunction set aside, but Judge Lewis refused to change or modify his former decision. The right of appeal is still open to the defendants.

On September 11, 1905, an action entitled "The United States of America, to the use of the Montrose Hardware Co. et al., plaintiffs, *v.* C. D. McPhee et al., defendants," was commenced in the State district court. This suit was instituted by the creditors, who furnished material and labor to the Taylor-Moore Construction Co., against the sureties on the bond of said campany in connection with its contract for the construction of the Gunnison Tunnel. On March 24, 1908, judgment was entered dismissing said suit, from which plaintiffs appealed to the State supreme court. On December 12, 1911, following judgment, an order was issued reversing the judgment of the district court and remanding the cause to the district court for a new trial. On March 23, 1912, a petition of intervention was filed on behalf of the United States. On April 9, 1912, a demurrer of plaintiff to the petition of intervention by the United

States was filed. A demurrer by defendant, J. B. Orman, to said petition of intervention of the United States was filed on April 27, 1912. Other pleadings in the way of amended answers and demurrers have been filed since January 1, 1912. On April 8, 1913, arguments were had on the demurrers to the bill of intervention filed by the United States. The demurrers were sustained, and the United States was given 30 days to amend its bill of intervention. Amended bill was filed by the United States on May 10, 1913.

On November 20, 1912, condemnation proceedings were commenced in the United States District Court for the District of Colorado against Emily Carrie Bever et al., to secure parcel of land for canal right of way in sec. 11, T. 48 N., R. 10 W., N.M.P.M., for the West Canal extension. On December 16, 1912, an order for immediate possession was given to the United States. Since said date the suit has been amicably settled, but will not be dismissed until deed has passed to the United States.

On June 19, 1913, a suit for the condemnation of a parcel of land in sec. 2, T. 50 N., R. 10 W., N.M.P.M., was filed in the United States District Court for the District of Colorado against A. E. Buddecke and W. H. Crecelius. July 21, 1913, has been set as the day for hearing the application of the United States for immediate possession.

IDAHO, BOISE PROJECT.

On July 22, 1912, application was made to the district court of the State of Idaho, in and for Canyon County, for a temporary decree distributing the water of Boise River for the season of 1912, in the case of Farmers' Cooperative Ditch Co. *v.* Riverside Irrigation District et al. (Boise River priority suit). On July 22, 1912, an order was issued by the court distributing the water for the balance of the season of 1912, as follows:

From July 23, to and including July 25, 0.80 of a miner's inch per acre.
From July 25, to and including July 28, 0.75 of a miner's inch per acre.
From July 28, to and including July 31, 0.70 of a miner's inch per acre.
From July 31, to and including August 3, 0.65 if a miner's inch per acre.
From and after August 3, 0.60 of a miner's inch per acre.

In the case of United States *v.* State of Idaho, for the condemnation of 40 acres of land needed for the Arena Basin Wasteway Reservoir, an agreement was reached between the Government and the State as to the value of the land desired and a stipulation entered accordingly; on December 19, 1912, final order of condemnation was entered conveying title in fee from the State to the United States.

In the case of Pioneer Irrigation District *v.* Stone, suit was filed by the Pioneer Irrigation District for the purpose of testing the validity of the proposed contract between the district, the Water Users' Association, and the Government, for the construction of a drainage system in the Pioneer Irrigation District and for a proportionate interest in the Arrowrock Reservoir, the questions involved in this case being the authority of each party to the suit to make the contract in question. This case was argued in the State Supreme Court on February 5, 1913, and a few days later the court rendered judgment confirming the validity of the proposed contract, and holding that the Secretary of the Interior had authority to make

the contract; that the reclamation act, and acts amendatory thereto, are constitutional and sufficient authority for the construction of the works in question; that the irrigation district had the authority to make the contract, and that an irrigation district not only had the power to make a contract for the construction of a drainage system in the District, but that it was the duty of the district to provide for such a drainage system, and also that the Water Users' Association had the power to make the contract in question. This proceeding was followed by application to the district court to confirm the apportionment of benefits in the district as made by the directors of the district. The apportionment of benefits was duly affirmed by the decision of the Supreme Court.

IDAHO, MINIDOKA PROJECT.

On August 8, 1912, complaint was filed in the case of Ray *v.* Fogg et al., in which the plaintiff applied for an injunction to restrain the project engineer of the Minidoka project, and his subordinates and employees, from constructing a drainage ditch across a homestead of the plaintiff. On August 8, 1912, temporary injunction was issued *ex parte* on the application of the plaintiff, restraining Project Engineer Fogg and his subordinates from doing any work on the ditch across the plaintiff's land. On August 14, 1912, a motion was filed by the Government attorneys on behalf of the project engineer to dissolve the injunction, and affidavits supporting the same were filed on the same date, and motion to dissolve the injunction was argued before the court. On August 14, 1912, the motion to dissolve the injunction was sustained by the court and order dissolving the injunction entered, the court holding that the injunction had been erroneously issued as the right of way for the drainage ditch was reserved under the act of August 30, 1890.

On June 20, 1913, the case of Twin Falls Canal Co. *v.* Foster (Snake River priority suit) was tried before the District Court of the State of Idaho in and for Twin Falls County, at Twin Falls, Idaho, and sufficient evidence introduced to make out a prima facie case upon the evidence. Stipulations were then filed as agreed by the several parties who signed the contract for the enlargement of the Jackson Lake Reservoir, and on June 20, 1913, final decree was entered by the court decreeing the priorities to the use of the waters of Snake River, as between the Minidoka project, the North Side Twin Falls project, and the South Side Twin Falls project.

KANSAS, GARDEN CITY PROJECT.

No action was taken during the fiscal year 1913 in the case of the Camden Iron Works *v.* the United States in the Court of Claims. This case is referred to on page 31 of the Eleventh Annual Report.

MONTANA, BLACKFEET PROJECT.

In 1911, George W. Cooke and David D. La Breche instituted suit against the United States in the United States District Court for the District of Montana, asking for damages in the sum of $25,000 for lands and property taken for Lower Two Medicine Lake Reservoir

site, and for an injunction restraining the United States from constructing Lower Two Medicine Lake Dam. The plaintiffs requested that the court confirm certain selections made by them of lands within the reservoir site. The case was tried February 1, 1913. In June, 1913, the court rendered its decision confirming the selections of the plaintiffs, stating that their property destroyed exceeded the sum of $5,000, but withheld the issuance of an injunction.

MONTANA, ST. MARY STORAGE.

In 1911 the United States instituted proceedings in ejectment against Caroline Henkel and Henry Henkel, her husband, and their several children, to recover possession of a tract of land south of Swift Current Creek and adjacent to the north end of Lower St. Mary Lake. Judgment was rendered in favor of the United States in the District Court for the District of Montana, and, on appeal by the defendants to the Circuit Court of Appeals at San Francisco, in May, 1913, judgment was rendered sustaining the lower court. Upon application of the United States writ of ejectment was issued, and the United States is now in possession of the property. The defendants have appealed to the Supreme Court of the United States, where the case is pending and will be set for trial at the October term of court.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

A criminal action was brought by the United States against John H. Gable, who was indicted for the unlawful appropriation of water from an irrigation canal of the United States on the Lower Yellowstone project, Montana-North Dakota. Trial of the case was had before a jury on October 22, 1912, and the defendant was found guilty, the court assessing the maximum penalty, a fine of $50 and costs.

In 1911 the Pacific Coast Construction Co., defaulting contractor on the Lower Yellowstone Dam, instituted an action against the United States in the Court of Claims whereby it sought to recover $34,582.50. The United States in due time filed a petition in the nature of a set-off and counterclaim, claiming judgment against the claimant in the sum of $111,310.75, and petition against the United States Fidelity & Guaranty Co. in the sum of $40,000, it being the bondsman of the claimant. In June, 1913, it was arranged that testimony should be taken at Boise, Idaho, about August 25, 1913.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

In the two cases of the North Platte Canal & Colonization Co. against the United States, mentioned in the Eleventh Annual Report, the Court of Claims overruled demurrers interposed by the United States. No further action was taken during the fiscal year in these cases. Testimony on behalf of the Government will probably be taken during the summer and fall of 1913.

Several suits in connection with water rights on interstate streams, to which the United States is not a party, are pending in Federal

and State courts. These cases have been closely followed, especially where they may have some bearing on the situation of the North Platte River. Up to the end of the fiscal year it was not thought the United States should participate in any of these suits.

NEVADA, TRUCKEE-CARSON PROJECT.

On December 15, 1911, complaint was filed by the United States in the United States Circuit Court for Nevada against S. B. Smart et al., for acquisition of right of way by condemnation. Default was entered against defendants, and evidence taken as to the value of the property, resulting in compensatory award on November 26, 1912, of $100, which has been paid.

The condemnation suit relating to the outlet of Lake Tahoe, begun by the United States on February 24, 1909, against the Floriston Pulp & Paper Co. et al., has remained in statu quo, save as to the filing of an amended complaint, somewhat enlarging the description of land to be acquired, etc. Active preparations for the trial of this case are now in progress.

The proceedings in United States *v.* Rickey Land & Cattle Co. remain indefinitely suspended.

On March 3, 1913, suit was filed by the United States against water users and claimants along the Truckee River and its tributaries looking to the adjudication of the relative rights to the waters of that stream system. Surveys and examinations by Reclamation Service engineers have been in progress.

The John Horstman Co. and Natron Soda Co., corporations, have each filed in the Court of Claims of the United States suits asking for compensation in the sums of $35,000 and $170,000, respectively, for the alleged appropriation by the Government by way of seepage from the bordering irrigation canals of property of claimants in Big Soda Lake and Little Soda Lake with the plants and works connected therewith. A decision overruling demurrer of the Government in the Horstman case was handed down by the Court of Claims on June 2, 1913. Preparations for trial in each instance are in progress.

In the case of the Western Co. *v.* Stone & Webster Construction Co., Truckee River General Electric Co. et al., complaint filed September 24, 1912, and temporary restraining order issued September 25 requiring defendants to show cause October 2. On that date the case was removed to the Federal court in San Francisco on petition of the two defendants named.

NEW MEXICO, CARLSBAD PROJECT.

On October 3, 1912, a suit was commenced in the United States District Court for the District of New Mexico, entitled "U. S. *v.* John H. Fanning," for the collection of rental due under a grazing lease covering withdrawn land on an island in Lake McMillan. The lessee refused to pay. Answer was filed by defendant, but the case came on for hearing satisfactory settlement was made and the action was dismissed on motion of the United States.

NEW MEXICO, HONDO PROJECT.

March 17, 1913, suit was filed in the United States District Court for the District of New Mexico against El Paso & Rock Island Railway Co. et al., having for its object the adjudication of the water rights of the Hondo River and its various tributaries. Service was had upon the defendants, of which there are between 400 and 500. The usual time for answer was extended for 90 days from date of service, allowing until July 1, 1913, for the filing of answer.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

An action designed to adjudicate the water rights of the Rio Grande in New Mexico, entitled, "Oscar C. Snow *v.* Francisco Abalos et al.," was filed in the District Court for the Third Judicial District of New Mexico, under date of October 24, 1912. There are named in the complaint some 6,000 defendants, the majority of whom have appeared and filed answers setting up their claim. Owing to the large number of defendants and the enormous amount of detail work involved the case is not yet ready for the hearing of testimony.

The case entitled "El Paso Valley Water Users' Association *v.* W. H. Austin et al.," mentioned on page 32 of the Eleventh Annual Report, being an action for the adjudication of the water rights of the Rio Grande in Texas, has been held in abeyance awaiting the enactment by the legislature of a suitable law providing for the adjudication of these rights. Such a provision was embodied in a general irrigation bill introduced and passed at the last session, but this provision was eliminated from the bill as passed and approved (H. B. No. 37, by Burges & Glasscock). It will therefore be necessary to proceed with this case under the general laws.

OREGON, UMATILLA PROJECT.

In the determination of relative rights to the waters of the Umatilla River and its tributaries, begun September 1, 1911, the 188 contests filed by the United States, the three initiated against the Government, and the 40 or 50 contests between private parties have been disposed of, except that some testimony of a general character and additional evidence in one or two of the contests will be introduced on August 4, 1913, and the few days following. Briefs are being prepared and it is planned to have the decree in effect prior to the beginning of the next irrigation season.

The case of The City of Stanfield *v.* The Umatilla Water Users' Association and Herbert D. Newell, filed in the circuit court of the State of Oregon for Umatilla County on May 31, 1911, was dismissed with consent of counsel for the parties on August 3, 1912. Plaintiff in this case claimed that the project feed canal by reason of seepage had caused the ground water to rise and flood the streets and fill the cellars of the city.

Demurrer filed by the United States attorney on behalf of the defendant in the case of The Maxwell Land & Irrigation Co. *v.*

The Hermiston Bank & Trust Co. was argued before G. W. Phelps, judge of the circuit court for Umatilla County, by counsel for the parties on April 10, 1913. The demurrer was sustained and opinion handed down a few weeks thereafter holding that the State court had not jurisdiction.

OREGON-CALIFORNIA, KLAMATH PROJECT.

The case entitled "Klamath Lake Navigation Co. *v.* California Northeastern Railway Co. and Southern Pacific Co.," relating to the closing of the Klamath Strait to navigation, in which the Government intervened by way of suggestion on September 30, 1910, has remained in statu quo since motion to strike and demurrer to the Government's suggestion was overruled on November 10, 1910.

Condemnation proceedings against William Albright and wife and M. P. Mickler for right of way for second-unit laterals were begun by the Government in the United States district court on February 17, 1912. Settlement satisfactory to the United States has been made, involving the payment to defendants of $1,175 and agreement to construct certain farm bridges, protection of existing private ditches, etc.

Condemnation proceedings against the Olene Live Stock Co., a corporation, for right of way for the second-unit laterals, were begun by the Government in the United States district court on February 17, 1912. Settlement satisfactory to the United States has been made, involving the payment to defendants of $500 and provisions against interference with existing private ditches, springs, wells, etc.

Complaint was filed on September 21, 1911, in the United States district court against C. A. Bunting and wife praying that defendants be enjoined from cutting and interfering with Government canals traversing their properties. Testimony was taken at Klamath Falls before a special examiner and final hearing with argument of counsel occurred recently at Portland. Written briefs have been submitted and a decision is expected shortly.

A determination of the relative rights to the waters of Lost River and its tributaries has been begun before the State water board, and consideration is being given to a proposed appearance, on behalf of the Government by way of suggestion, without submitting to the jurisdiction of the State tribunal, giving notice of the Government's reserved and prior rights to the waters of the Klamath Basin.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

The Circuit Court of Appeals for the Eighth Circuit sustained the finding of the district court in the case of the United States *v.* The Widell-Finley Co., mentioned in the Tenth and Eleventh Annual Reports.

In the case of the Widell-Finley Co. et al., in the Court of Claims, mentioned in the Eleventh Annual Report, no evidence was taken during the fiscal year 1913.

WASHINGTON, OKANOGAN PROJECT.

In the suit of the United States against W. S. Bennett et ux., referred to on page 33 of the Eleventh Annual Report, the decree of

the court below gave the defendants the right to divert for irrigation 1½ cubic feet per second, measured at the point of diversion during an irrigation season from April 15 to September 15. An appeal was taken to the Circuit Court of Appeals for the Ninth District and was argued on February 16, 1913. No decision has been rendered.

The case of W. S. Bennett et ux. against Okanogan Water Users' Association, Ferd Bonstedt, project engineer, et al., in the Superior Court of Washington for Okanogan County, to quiet plaintiffs' title and to enjoin the association, the project engineer, and others from interfering with certain alleged water rights of the plaintiffs, is still in abeyance pending final decision in the related case of United States *v.* W. S. Bennett and Wife.

In the action against E. K. Pendergast et ux. dismissal was entered in accordance with the agreement outlined in the Eleventh Annual Report.

WASHINGTON, YAKIMA PROJECT.

In the suit of Swigart *v.* Baker, referred to on page 33 of the Eleventh Annual Report, the United States Supreme Court, on May 26, 1913, rendered a decision (229 U. S., 187) reversing the decision of the circuit court and affirming that of the district court. This decision specifically holds that the United States is authorized under the reclamation act to collect operation and maintenance charges; that the intent of the act was that the cost of each project should be assessed against the property benefited, and that the assessments, as fast as collected, should be paid back to the fund for use in subsequent projects without diminution.

In the case of the United States *v.* Theodore Weisberger, in the United States District Court for the Eastern District of Washington, southern division, referred to on page 34 of the Eleventh Annual Report, a decree was entered September 30, 1912, in favor of the defendants, dismissing the suit. This case relates to a suspended construction contract entered into in connection with the Tieton unit. An appeal was taken from the decision of the district court and was argued before the circuit court of appeals on May 9, 1913. No decision has yet been rendered.

In the suit of United States *v.* H. K. Luce, Standard Building Co., and Empire Surety Co., referred to on page 34 of the Eleventh Annual Report, trial was had on February 26, 1913, and judgment, amounting to $10,544.13 damages and $24.40 costs, entered for plaintiff. No appeal has been taken.

In the superior court case of H. K. Luce and Standard Building Co. against Charles H. Swigart et al., page 34 of Eleventh Annual Report, no further action has been taken.

In the suit brought against the Union Gap Irrigation Co., to enjoin the diversion of water, referred to on page 35 of Eleventh Annual Report, an order was made for the introduction of further testimony. It is anticipated that the case will be submitted at the July term.

In a second suit against the same corporation the defendant has stipulated to construct the necessary improvements of the canal,

upon which work is being prosecuted. A case for damages against the same defendant is in abeyance.

The condemnation suit of United States against George W. Chute et ux., Sunnyside unit, referred to on page 35 of the Eleventh Annual Report, was tried at the October term and judgment rendered fixing damages at $2,000.

The case of the United States against the West Side Irrigating Co., referred to on page 35 of the Eleventh Annual Report, will probably be tried at the fall term.

Actions for the collection of delinquent operation and maintenance charges, brought in the United States district court against Aumiller, Granger Land Co., and Non-Forfeiture Land Co., Meyer and Davidson, Meyer and Buchanan, and Meyer and Nessley, mentioned in the Eleventh Annual Report, have been dismissed, the amounts due having been paid in full. A similar case against Bogart et ux. has been brought and settled in the same manner.

In December, 1912, an action was brought by the United States against the Oregon-Washington Railroad & Navigation Co., and the North Coast Railroad Co., in the District Court of the United States for the Eastern District of Washington, southern division, to declare forfeited the railroad right of way through McAllisters Meadow Reservoir site. On April 18 an order was entered on stipulation, declaring said right of way revoked and quieting title thereto in the United States.

WYOMING, SHOSHONE PROJECT.

In 1912 the United States Fidelity & Guaranty Co., of Baltimore, Md., instituted suit against the United States in the Court of Claims for the recovery of $822,777.58 as damages and for extra work performed in the construction of the Shoshone Dam, Shoshone project, Wyoming. The claimant was the bondsman of Prendergast & Clarkson, the original contractors on the dam. In August, 1912, the testimony of several witnesses was taken at Cody, Wyo., before a commissioner appointed by the court, and during the same month testimony was taken at Seattle, Wash., Vancouver, B. C., and San Francisco, Cal. No testimony was taken on behalf of the United States. Progress is being made toward taking testimony of witnesses on behalf of the United States.

PURCHASES OF RIGHTS AND PROPERTY.

Section 7 of the reclamation act provides that where, in carrying out the provisions of the act, it is necessary to acquire any rights or property, the Secretary of the Interior may acquire them for the United States by purchase or by condemnation through judicial process. A total of $274,593.78 was paid during the fiscal year 1913 for the acquisition of such rights and property. The following statement shows, by projects, the amount paid to June 30, 1912, the amount paid during the fiscal year 1913, and the total:

Purchases of rights and property.[1]

Project.	Amount.		
	To June 30, 1912.	During fiscal year 1913.	Total to June 30, 1913.
Arizona, Salt River	$684,480.24	$15,364.25	$699,844.49
Arizona-California, Yuma	90,857.10	4,011.40	94,868.50
California, Orland	115,197.50	1,096.00	116,293.50
Colorado:			
Grand Valley	7,400.00	206,575.00	213,975.00
Uncompahgre Valley	134,133.33	2,869.00	137,002.33
Idaho:			
Boise	344,782.58	2,295.00	347,077.58
Minidoka	50,244.50	760.00	51,004.50
Kansas, Garden City	894.00		894.00
Montana:			
Flathead	8,463.31	657.66	9,120.97
Huntley	1,029.72		1,029.72
Milk River	22,878.50	12,502.74	35,381.24
Sun River	15,850.75	8,089.54	23,940.29
Montana-North Dakota, Lower Yellowstone	18,797.97	232.50	19,030.47
Nebraska-Wyoming, North Platte	215,120.25		215,120.25
Nevada, Truckee-Carson	54,173.99	8,000.00	62,173.99
New Mexico:			
Carlsbad	150,000.00		150,000.00
Hondo	20,000.00		20,000.00
New Mexico-Texas, Rio Grande	253,748.79	5,912.00	259,660.79
North Dakota, North Dakota pumping	2,962.50		2,962.50
Oregon, Umatilla	32,844.37	193.25	33,037.62
Oregon-California, Klamath	539,147.63	3,234.00	542,390.63
South Dakota, Belle Fourche	49,747.33		49,747.33
Utah, Strawberry Valley	22,036.88		22,036.88
Washington:			
Okanogan	30,030.52		30,030.52
Yakima	316,738.05	5,534.30	322,272.35
Wyoming, Shoshone	187,575.42		187,575.42
Total	3,369,135.23	277,335.64	3,646,470.87

[1] This table first printed in Eleventh Annual Report, p. 36.

A more detailed statement for the fiscal year, giving, by projects, the name of the vendor, a description of the property acquired, the consideration paid in each case, and the date of the deed, will be found in the appendix, pages 273 to 287.

FINANCES.

The statement of cash receipts and payments appearing below shows that at the beginning of the fiscal year there was a little over $5,000,000 of cash on hand, and that during the year this amount was augmented by receipts from various sources to a grand total of slightly over $12,000,000, and that expenditures during the fiscal year were approximately $8,800,000, leaving on hand at the close of the fiscal year about $3,200,000. In pursuance of the plan that has been followed in the Land Office and Treasury Department, the public-land sales were promptly settled and the amount credited to the reclamation fund within a few months after their receipt. This has enabled the service to continue the work without resort to the loan authorized by act of June 22, 1910 (36 Stat., 835).

The reclamation fund which includes the moneys received from the sale of public lands and town-site lots has now reached the grand total of $79,450,438.53. During the year 33,087 disbursement vouchers and 13,261 collection vouchers were prepared, examined,

and settled. Transfer vouchers adjusting accounts between the projects for the transfer of the value of services and equipment numbered 1,092. Since the beginning of the service the value of the transfers of supplies, materials, equipment, and services between projects has amounted to $4,547,797.45. This system of transfers between projects has enabled the service to utilize equipment, materials, supplies, etc., to their fullest extent where needed and to charge the cost where the benefit accrued.

CASH TRANSACTIONS.

Below is shown in the statement of cash receipts and payments a summarized exhibit of the cash transactions during the year:

Statement of cash receipts and payments.

RECEIPTS.

On hand July 1, 1912 (Eleventh Annual Report, p. 38) (cash in project offices and local land offices awaiting remittance $28,793.41, accounted for below in miscellaneous collections)		$5,241,651.37
Receipts during year:		
Original receipts—		
Public-land sales	$4,373,452.38	
Townsite lands	17,784.74	
		4,391,237.12
Repayment of water-right charges		1,075,647.77
Miscellaneous receipts		1,302,251.59
Collections in project offices not classified and remitted		5,227.09
		12,016,014.94

PAYMENTS.

From reclamation fund	8,752,738.38
From Rio Grande Dam appropriation	39,166.89
Balance on hand June 30, 1912:	
Reclamation fund—	
In Treasury	2,037,978.58
In depositories to credit of special fiscal agents	1,179,403.00
Cash in project offices awaiting remittance	5,227.09
Rio Grande Dam appropriation in Treasury	1,501.00
	12,016,014.94

ASSETS AND LIABILITIES.

Below is presented a balance showing assets and liabilities of the service as of June 30, 1913. This is a combined statement made up from the records kept on the several projects and in the office at Washington, D. C. The project records are controlled by the accounts kept at Washington.

Statement of assets and liabilities June 30, 1913.

ASSETS.

Cash:		
With Treasurer United States, reclamation fund	$2,037,978.58	
In depositaries to credit of special fiscal agents, reclamation fund	1,179,403.00	
With Treasurer United States, Rio Grande Dam	1,501.00	
		$3,218,882.58

Collections returnable to fund through Treasury:			
In special fiscal agents' hands awaiting remittance		$3,936.97	
In other employees' hands awaiting transfer to special fiscal agents		1,290.12	
			$5,227.09
Accounts receivable:			
Freight refunds		102,220.68	
Water rentals		173,841.59	
Miscellaneous rentals		19,567.91	
Miscellaneous		128,665.87	
Water-right building charges		1,220,187.00	
Water-right operation and maintenance charges		494,523.87	
			2,139,006.92
Inventories:			
Mercantile stores		87,746.91	
Equipment in use—			
Animals	$193,302.88		
Mechanical and other	1,562,767.97		
		1,756,070.85	
Materials, supplies, etc., in storehouse		812,454.06	
Cement		77,998.34	
Structural iron and steel		52,611.39	
Lumber		123,175.03	
Explosives		30,316.33	
Forage		33,870.53	
Fuel		31,199.55	
Products of local operations		70,439.02	
Goods in transit		14,658.17	
Unadjusted transfers between projects		46,631.89	
Undistributed cost (freight and handling) on inventory property		22,047.07	
			3,159,219.14
Improvements to land:			
Gross cost		81,572,794.00	
Less credits from incidental operations—			
Rentals of cottages	$72,424.59		
Rentals of grazing lands	107,058.95		
Rentals of power and light	333,348.83		
Rentals of irrigation water	1,627,889.40		
Rentals of telephones	10,002.03		
Revenues, miscellaneous	86,558.88		
Profits on mess operations	97,008.75		
Profits on mercantile stores	212,002.44		
Profits on hospital	4,626.78		
Profits on miscellaneous	4,953.37		
Adjustments—			
Contractors' freight refunds	145,258.34		
Forfeitures by defaulting bidders and contractors	117,135.10		
		2,818,267.46	
			78,754,526.54
Deferred operation and maintenance			1,547,980.05
Total assets			88,824,842.32

LIABILITIES.

Accounts payable:		
Labor	$278,738.20	
Purchases	244,763.75	
Contract estimates	234,343.41	
Contract holdbacks	138,268.81	
Freight and express	170,084.44	
Passenger fares	8,439.59	
Land agreements	57,204.17	
Coupons	2,352.36	
Meal tickets	2,351.76	
Miscellaneous	26,924.49	
		1,163,470.98

Reserves:		
For amortization of original cost by repayment—		
Building charges accrued	$5,938,314.23	
Building advance collections	604,110.11	
Building collections forfeited	19,468.40	
	$6,561,892.74	
For depreciation on plant and equipment	477,812.95	
		$7,039,705.69
Unadjusted credits, net earnings of Government animals		171,227.12
Capital:		
Reclamation fund	79,450,438.53	
Rio Grande Dam	1,000,000.00	
		80,450,438.53
Total liabilities		88,824,842.32

REVENUES AND EXPENSES.

There follows a combined statement giving the revenues and expenses for the operation of projects which have been opened by public notices of the Secretary of the Interior. These revenues and expenditures are those resulting from operations connected with the lands thrown open to water-right applications by these public notices and do not include the transactions resulting from the temporary operation of canals during the construction period.

Combined statement of revenues and expenses for all operations under public notices to June 30, 1913.

EXPENSES.

Cost, ledger	$3,775,510.52

REVENUES.

Operation and maintenance charges accrued	1,920,597.41
Operation and maintenance charges forfeited	6,816.77
Operation and maintenance charges advance collections	5,038.14
Rental of lands and buildings	7,613.88
Rental of power and light	32,979.09
Rental of irrigating water	245,274.93
Miscellaneous revenues	9,210.25
Total revenues collected or due	2,227,530.47
Deferred revenues	1,547,980.05
Total revenues	3,775,510.52

Repayment contracts.—The development of the projects has resulted in water-right applications or contracts that have been entered into with water users, providing for repayment to the Government of the estimated cost of constructing the works for irrigating their lands. The contracts provide for payment to the Government of these charges in 10 annual installments. Sixteen of the projects have progressed sufficiently so that public notices have been issued and these repayment contracts negotiated. The total value of such contracts filed to date is $20,762,649.71. There has been collected $2,934,531.09, leaving the present asset value almost $18,000,000. There are still large acreages of land on most of the projects to which the service is now ready to furnish irrigation water, and which are being taken up from day to day and new contracts signed. On all

of the projects the present net investment of the Government exceeds the asset value of the contracts. When all of the lands susceptible of irrigation are covered by contract the value of the contracts should equal the amount of the total investment. It is to be noted in this connection also that on several of the projects additional investment will be necessary to make all of the lands irrigable.

ENGINEER WORK-ORDER SYSTEM.

During the past year the work-order system has been developed in many of its details. This system is designed to bring together, by means of suitable blanks and appropriate accounts, for convenience of reference and control, the authorization and apportionment of funds allotted for the construction and operation on the various projects of the service.

TRANSPORTATION AND PURCHASES.

(Chicago Office.)

Special concessions in freight rates from important shipping points to particular points of delivery on various projects were granted by the following companies during the fiscal year:

Chicago, Milwaukee & St. Paul Ry. Co.
Colorado Midland Ry. Co.
Denver & Rio Grande Ry. Co.
Great Northern Ry. Co.
Idaho Northern Ry. Co.
Oregon-Washington R. R. & Navigation Co.
Wells Fargo & Co. Express.

On July 1, 1912, the unsettled bills for freight and express charges amounted to $44,243.98. There were received during the fiscal year for administrative examination bills amounting to $505,963.68, and bills amounting to $499,861.42 were examined, and bases for settlement arranged with the claimants, leaving outstanding June 30, 1913, unsettled bills amounting to $50,346.24. Claims made by the transportation companies on freight and express charges settled during the fiscal year amounted to $499,861.42, and the amount due thereon, after examination at the transportation office, was $481,118.91. The commercial charges on these bills would have been $837,077.59.

On June 30, 1913, the records of the transportation office showed the status of expense bills covering shipments consigned to contractors to be as follows:

Expense bills on hand July 1, 1912	$286.34
Expense bills received during fiscal year	66,461.00
Expense bills on which claims were filed with transportation companies during fiscal year	40,658.17
Freight claims against transportation companies made on above expense bills	19,332.49
Expense bills, not subject to concessions, on hand or received during fiscal year	14,782.16
Expense bills on hand June 30, 1913	11,307.01

A total of 2,735 purchases of supplies for field use, amounting in cost to $459,890.17, was made through the Chicago office during the fiscal year. Cash discounts earned on account of prompt payment of bills and deducted from settlements amounted to $4,286.29 for the year.

The following table gives general data regarding freight and express charges since 1906:

Year.	Bills settled.	Commercial charges.	Deducted on account of freight contracts, etc.	
			Total.	Per cent.
1906–7	$278,782.10	$470,863.26	$192,081.16	40.8
1907–8	369,583.04	577,830.42	208,247.38	36.0
1908–9	778,047.12	1,403,970.10	625,922.98	44.5
1909–10	437,032.61	758,808.76	321,776.15	42.4
1910–11	405,360.55	666,876.59	261,516.04	39.2
1911–12	610,740.23	1,055,733.27	444,993.04	42.1
1912–13	481,118.91	837,077.59	355,958.68	42.5
Total	3,360,664.56	5,771,159.99	2,410,495.43	41.8

UNIT PRICES UNDER FORMAL SPECIFICATIONS.

In a table in the appendix, page 310, are given the principal unit prices bid for work and materials and contract unit prices therefor in connection with formal specifications proposals for which have been received by the Reclamation Service during the fiscal year ending June 30, 1913. Formal specifications issued during the year include those numbered from 217 to 240, inclusive. In almost all cases contracts have been awarded to the lowest bidder, but as the contracts have been awarded on definite divisions of the work as a whole it has frequently happened that the contract price for a particular item is higher than the lowest bid on that item. Unit bids and contract prices for cement, explosives, headgates, machinery, and electrical equipment are not included in the table referred to.

ELECTRICAL AND MECHANICAL ENGINEERING.

(Los Angeles Office.)

The following is a general report on the progress of work under the direction of this office during the fiscal year ending June 30, 1913.

Arizona, Salt River project.—During the fiscal year the Arizona Falls and South Consolidated power plants constructed by the Salt River Valley Water Users' Association were completed and placed in satisfactory operation, also the 10,000-volt transmission line connecting the Arizona Falls plant with the system. All work necessary to the purchase and construction of the electrical and hydraulic apparatus for the Crosscut power plant of the Salt River Valley Water Users' Association has been completed, as well as the plans and specifications for the construction of the building and the complete layout of all apparatus to be installed, and the designs and specifications for the butterfly headgates at the head of the penstocks. Specifications and drawings necessary for the reconstruction of the Roosevelt-Mesa transmission line were completed and the material purchased. Specifications and drawings for the extension of the line from Roosevelt to the Inspiration Consolidated Copper Co.'s plant and the Magma Copper Co.'s plant were prepared. Plans and specifications for the purchase of the complete apparatus for the

pumping station of the Highline Canal Construction Co. were furnished this company and the plant was constructed and put in operation.

Idaho, Boise project.—A number of purchases have been made for additions to the apparatus for the construction plant at Arrowrock Dam. The drawings and specifications for the high-pressure sluice gates to be installed at the dam were completed, contract entered into, and part of the material shipped. Preliminary designs were made for the installation of 20 balanced valves for the control of discharge and regulation of the power outlets in the Arrowrock reservoir. Considerable study was given to the preliminary layout of a power plant to be constructed at the Arrowrock Dam, and a set of record drawings of the completed power plant at the Boise Dam was finished.

Specifications have been prepared for the transmission line, substation, and distributing lines for furnishing power to the drag-line scrapers for drainage work for the Pioneer district.

Idaho, Minidoka project.—Specifications and drawings were prepared for the complete West End pumping station on the Minidoka project, the necessary purchases made, and the plant constructed and placed in operation. Specifications were made for an extension to the transmission lines for drainage work and for a duplicate supply to commercial power. Motors, transformers, and other apparatus were purchased for the drainage work. Designs and specifications were issued for the gate-operating mechanism for the radial gates to be installed in the spillway.

Montana, Milk River project, St. Mary storage.—Plans and specifications for the electrical and hydraulic apparatus for the proposed St. Mary storage unit were prepared and issued and bids obtained, but later investigations on the project resulted in the abandonment of the plant. A steel pressure pipe for the plant, which constitutes a part of the siphon, was purchased and installed.

Montana, Sun River project.—All of the work was done necessary to the layout and purchase of a complete distributing system for furnishing electric power to shovels and other apparatus for the construction work on the Sun River project. Contracts for the purchase of power from the Great Falls Power Co. were studied and revised. Specifications were issued and bids obtained on most of the above apparatus, but completion thereof was delayed on account of conditions on the project.

Nebraska-Wyoming, North Platte project.—Considerable work has been done in improving methods of control of balanced valves at the Pathfinder Dam. Plans and specifications were issued for the 48-inch butterfly gates for the Minatare Dam and studies for the final regulating needle valves were well advanced and approved for construction.

Nevada, Truckee-Carson project.—The transmission line from Lahontan to Fallon was completed; also the substation for supplying power to the city of Fallon, and contract entered into with the city for furnishing power for municipal purposes. Complete tests were made of the electric drag line and electric power shovel used in connection with the construction of the Lahontan Dam.

New Mexico-Texas, Rio Grande project.—A number of purchases have been made for the construction plant of the Elephant Butte Dam. Several board meetings have been held and studies made of the methods of installing balanced and other valves for the regulation of the discharge from the dam.

North Dakota, North Dakota Pumping project, Williston unit.—A contract was made for furnishing the city of Williston with power from the Williston power plant. The necessary remodeling of the plant was made and power was furnished throughout the winter of 1912 and 1913.

South Dakota, Belle Fourche project.—An automatic regulating device was designed, purchased, and installed and is in successful operation. This device is for automatically maintaining the discharge from the balanced valves at any fixed desired amount, regardless of the change of head or other conditions. Designs for similar apparatus are being carried forward for the Roosevelt Dam.

Utah, Strawberry Valley project.—Correspondence was carried on in regard to repairs and changes in water wheels caused by excessive wear on account of the water carrying large quantities of very fine silt. The commercial power was extended and the village of Benjamin connected up.

Washington, Okanogan project.—Complete estimates were prepared for the pumping system to be added to the Okanogan project, covering several small tracts of high land.

General.—In general it may be stated that all of the power plants in operation under the control of the Reclamation Service have given practically continuous service, with no unusual operating difficulties other than those imposed by climatic conditions or conditions of water supply.

The following table gives, in summarized form, the capacity, output, and construction costs for each of the most important power plants of the service:

Power-plant data.

Project.	Name of plant.	Capacity kw.		Cost	Output, kilowatt hours.	
		Rated.	Safe observed.		Sold.	Used by Reclamation Service.
Arizona, Salt River	Roosevelt	4,500	6,000	[1]$642,654.23	5,482,213	2,292,987
	South Consolidated	1,600	2,000			
	Arizona Falls	850	1,000			
Idaho, Minidoka	Minidoka	5,600	7,000	443,088.21	4,893,000	18,607,000
Idaho, Boise	Boise	1,500	2,400	167,905.37	1,981,018	2,899,220
Nevada, Truckee-Carson.	Lahontan	1,000	1,294	85,317.38	81,111	660,719
Utah, Strawberry Valley.	Spanish Fork	800	850	[2] 68,812.15		
New Mexico, Rio Grande.	Elephant Butte	1,500	1,500	136,491.83		1,412,084
North Dakota, Williston.	Williston	1,100	1,500		192,822	440,299
Total		18,450	23,544			

[1] Exclusive of cost of power canal, $1,201,000, and of diversion dam, $124,000. To the cost of the power plant will be added $75,000 to cover a large unit not yet installed, making a total cost of $717,654.23 and a total capacity of 12,000 kilowatts.

[2] Exclusive of cost of power canal.

CEMENT TESTS.

(Denver office.)

The amount of cement for which tests were made during the fiscal year ending June 30, 1913, was 181,653 barrels, of which 170,473 barrels were accepted and 11,180 barrels rejected. The following table shows the number of barrels for which tests have been made and the amount and per cent accepted, from 1904, when the testing laboratory was opened, to June 30, 1913:

Cement tested.

Year.	Amount for which tests were made.	Accepted.	
		Amount.	Per cent.
	Barrels.	*Barrels.*	
Jan. 1, 1904, to June 30, 1906	160,044	146,602	91.6
Year ending June 30, 1907	197,321	191,204	96.9
Year ending June 30, 1908	147,554	137,526	93.2
Year ending June 30, 1909	196,097	163,733	83.5
Year ending June 30, 1910	140,293	127,743	91.1
Year ending June 30, 1911	93,986	88,986	94.6
Year ending June 30, 1912	160,553	149,303	92.9
Year ending June 30, 1913	181,653	170,473	93.8
Total	1,277,501	1,175,570	92.0

All cement purchased during the fiscal year ending June 30, 1913, has been purchased under the new United States Government "Specifications for cement," issued under date of May 1, 1912, and the methods of testing employed in the laboratory have conformed with those provided for by these specifications. In the appendix, page 294, will be found a table giving the average results of all tests on accepted cement from January 1, 1904, to June 30, 1913.

Regular sets of long-time tests have been continued and occasional chemical analyses have been made as a matter of record on all brands of cement under test. Other general work has included sand and sand-cement tests for various projects; water analyses for various projects; continuation of tests and analyses in connection with the investigation of the action of alkali on cement concrete; and miscellaneous tests and analyses as required. The laboratory has taken part during the year in two series of tests carried out under the auspices of the Joint Conference on Uniform Methods of Tests and Standard Specifications for Cement, representing the American Society of Civil Engineers, the American Society for Testing Materials, and the United States Government.

SAND-CEMENT PLANTS.

Introduction.—Sand cement is the product obtained by regrinding Portland cement with a certain proportion of sand or other suitable siliceous material to a higher degree of fineness than that of the original cement. The first cost of the necessary grinding plant and the cost of operation render the process unsuitable for use on small and widely scattered structures. The process is, however, well suited

for use on such structures as masonry storage dams, for which large quantities of cement are required, especially when these structures are so located that the cost of transporting this cement to the site becomes a large item in the total cost of the structures. Under these conditions a material saving in cost can be made by the use of the sand-cement process.

Preliminary investigations.—The possibility of using sand cement as a substitute for Portland cement has been under consideration by the Reclamation Service since 1904. In 1905 a general series of long-time laboratory tests on sand cements was begun, the results of which have since become available from time to time. During 1911 special investigations were made as to the suitability for sand-cement manufacture of the materials available for this purpose at the sites of three proposed structures, the Arrowrock Dam on the Boise project in Idaho, the Elephant Butte Dam on the Rio Grande project in New Mexico, and the Lahontan Dam on the Truckee-Carson project in Nevada. The first two of these structures are high masonry dams; the third is an earthen dam, but has heavy masonry spillways and other auxiliary works. As a result of these tests and investigations the use of sand cement was adopted for the three structures named and the necessary plants for its manufacture at these points were completed and put in operation during the fiscal year ending June 30, 1913.

Materials used.—The Portland cement used at these plants is purchased and shipped under the regular cement contracts of the service. The field materials with which it is blended are: At Arrowrock, Idaho, granite obtained from the spillway excavation; at Elephant Butte, N. Mex., sandstone from the quarry from which rock for concrete is obtained; at Lahontan, Nev., a so-called "silt" that is the product of disintegration of a basaltic rock of volcanic origin, obtained from the same burrow pit as the material used in the construction of the dam embankment. These materials are blended with the Portland cement in proportions of from 45 to 50 per cent by weight. The following statement shows the general chemical composition and specific gravity of these materials, and also the percentage of so-called "soluble" or "colloidal" silica which they contain, the presence of which is considered to be a measure of their value for the purposes of sand-cement manufacture:

	Arrowrock granite.	Elephant Butte sandstone.	Lahontan silt.
Silica (SiO_2)	74.76	81.46	50.96
Alumina (Al_2O_3)	13.51	10.01	18.37
Iron (Fe_2O_3)	1.14	1.70	6.57
Lime (CaO)	.85	.80	10.20
Magnesia (MgO)	.38	.76	.45
Alkalies (K_2O+Na_2O)	7.25	3.01	3.92
Loss on ignition (H_2O,Co_2)	1.27	2.00	7.26
"Soluble" silica	2.39	6.80	12.98
Specific gravity	2.64	2.45	2.62

Plant equipment.—The mechanical equipment of these plants consists essentially of tube mills for grinding, together with the necessary auxiliary equipment, such as conveyors and elevators, for con-

veying the materials to and from the storage bins. In the case of the Arrowrock and Elephant Butte plants the auxiliary equipment includes crushing machinery and ball mills for preliminary grinding, by which the rock used is reduced to a size passing a No. 20 screen before mixing it with the cement for admission to the tube mills. The equipment of these two plants also includes rotary dryers for drying the crushed rock previous to its admission to the ball mills. The silt used at the Lahontan plant is, however, extremely dry in its natural state and is mixed with the cement for grinding without any preliminary treatment, except that of screening on a No. 4 sieve. All three plants are electrically operated by power plants that furnish power for general construction purposes on the structures with which they are connected.

Tests of product.—The standard that has been set for fineness of grinding on the finished product of these plants is that approximately 90 per cent shall pass the No. 200 sieve. A testing laboratory is maintained in connection with each plant and the process of manufacture is closely followed with routine tests on the product obtained. In general it is required that the product of these plants shall pass the standard tests provided for Portland cement with the exception of those for specific gravity and chemical composition. The equipment of the laboratories at the Arrowrock and Elephant Butte plants includes a 200,000-pound compression testing machine, by the use of which regular tests are made on samples of concrete taken from the material as it actually goes into the work.

Statement of costs, production, etc.—The following statement shows the cost of these plants, their rated capacity per 24-hour day, the amount produced during the fiscal year, the average cost per barrel of this production, and the approximate saving per barrel over the cost of Portland cement if this had been used in place of the sand cement manufactured at these plants:

	Arrowrock.	Elephant Butte.	Lahontan.
Cost of plant	$57,000.00	$57,250.11	$12,277.20
Capacity per 24 hours (barrels)	1,200	1,600	300
Production during fiscal year (barrels)	71,300	8,455	15,670
Average cost per barrel[1]	$1.63	$1.628	$1.848
Approximate saving per barrel over cost of Portland cement	$0.73	$0.87	$0.57

[1] Including an allowance for depreciation on plant sufficient to cancel the cost of plant during the construction period of the dam.

PERSONNEL.

On June 30, 1913, the force of the Reclamation Service comprised 6,611 persons, subdivided as follows: Secretary's appointees, 478; registered employees, 1,207; and laborers, etc., employed temporarily and locally on the various projects, 4,926. In addition the employees of contractors working on reclamation projects numbered 1,005. A more detailed statement giving the administrative personnel of the service and the number of employees by projects, classified as above, will be found in the appendix, pages 348 to 351.

INJURIES TO EMPLOYEES.

Under the terms of the act of May 30, 1908, regarding injuries to employees of the United States and compensation therefor, 454 injuries to employees of the Reclamation Service were reported during the calendar year 1912, the corresponding figure for 1911 being 328. The number of injuries reported per 1,000 employees increased from 52.9 in 1911 to 70.2 in 1912. In 1912 claims for compensation were allowed in 223 of the cases of reported injury, or 49.1 per cent, and in 1911 in 129 cases, or 39.3 per cent. The number of injuries for which claims for compensation were allowed per 1,000 employees increased from 20.8 in 1911 to 34.5 in 1912.

The average compensation paid in 1911 amounted to $187.26; payments have not yet been completed for injuries received in 1912.

Further detailed statistics showing the number of injuries and compensation paid, by projects, will be found in the appendix, page 352.

INOCULATION WITH ANTITYPHOID VACCINE.

In July, 1912, arrangements were made with the Surgeon General of the Army to furnish the Reclamation Service with specified quantities of typhoid prophylactic, as requested. Circulars were sent to the field urging the employees to volunteer for treatment, and the engineers and project physicians were requested to aid in the work as far as possible by informal talks to the employees regarding the dangers of typhoid and the necessity of taking every precaution to prevent an outbreak of the disease.

Requests for a supply of vaccine sufficient to inoculate over 500 persons were received from the field and referred to the Army Medical School, where the vaccine is prepared and from which it was shipped direct to the specified projects, together with full instructions for its administration. Not all those who volunteered took the treatment, but at the end of the fiscal year reports regarding the reactions noted after inoculation had been received from 269 cases. These are summarized in the following table:

	Number of patients.	Reaction.			
		Absent.	Mild.	Moderate.	Severe.
First dose	269	152	95	20	2
Second dose	266	155	83	23	5
Third dose	249	188	57	2	2
Per cent:					
First dose	100	56.5	35.3	7.4	.8
Second dose	100	58.3	31.2	8.6	1.9
Third dose	100	75.5	22.9	.8	0.8

The comparative mildness of the treatment is indicated by the fact that, following the first dose, the reactions were either absent entirely or mild in character in 91.8 per cent of the cases, after the second dose in 89.5 per cent, and after the third dose in 98.4 per cent.

DISCUSSION OF PROJECTS.

(A brief statement of the origin of each project and of the preliminary investigations made, and a concise description of the construction work completed prior to July 1, 1910, may be found in the ninth annual report. For principal current contracts, data for complete projects, and results to June 30, 1913, see appendix.)

ARIZONA—SALT RIVER PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Maricopa and Gila.

Townships: 3 S. to 3 N., Rs. 1 to 6 E. and 3 to 5 W., Rs. 11 to 14 E., Gila and Salt River meridian.

Railroads: Santa Fe, Prescott & Phoenix; Arizona Eastern.

Railroad stations and estimated population January 1, 1913: Phoenix, 18,800; Mesa, 2,400; Glendale, 1,000; Tempe, 2,000; Chandler, 200; and Peoria, 200.

WATER SUPPLY.

Source of water supply: Salt and Verde Rivers and wells in various parts of the valley.

Area of drainage basins at Granite Reef Dam: Salt River, 6,250 square miles; Verde River, 6,000 square miles.

Annual run-off in acre-feet: Salt River at Roosevelt (5,760 square miles), 1889 to 1912, maximum 3,226,000; minimum, 154,000; mean, 788,538 acre-feet. Verde River at McDowell (6,000 square miles), 1889 to 1912, maximum. 1,850,000; minimum, 117,000; mean, 535,085 acre-feet.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1913: 180,000 acres.

Area under rental contracts or other arrangements, season 1912–13: 190,000 acres. (This includes acreage to which Reclamation Service is delivering service, plus acreages under independent systems, approximating 30,000 acres.)

Length of the two irrigating seasons, 365 days; summer, June 1 to September 30; winter, October 1 to May 31.

Average elevation of irrigable area: 1,200 feet above sea level.

Average annual rainfall on irrigable area: 8 inches; calendar year 1912, 6.87 inches.

Range of temperature on irrigable area: 22° to 117° F.

Character of soil of irrigable area: Sandy loam, with clay in places.

Principal products: Semitropical fruits, alfalfa, grain, cotton.

Principal markets: Phoenix and other Arizona towns, Pacific coast cities, and eastern markets.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contract.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun: 1902.
Construction recommended by the director: March 7, 1903.
Construction conditionally authorized by Secretary: March 14, 1903.
Contract for construction of Roosevelt Dam approved: March 13, 1905.
Cement mill completed and machinery installed: March, 1905.
Construction of Granite Reef Dam authorized: January 13, 1906.
Temporary hydro-electric power plant installation completed: March, 1906.
Grand, Water Power, Salt River Valley, Maricopa, and Joint Head canals purchased: June 15, 1906.
Sand-crushing plant completed: August, 1906.
Power Canal completed: October, 1906.
Arizona Canal purchased: June 20, 1906.
Irrigation by the Reclamation Service begun: May 15, 1907.
Granite Reef Dam completed: August, 1908.
Appropriator's Canal acquired: January 19, 1909.
Transmission line from Roosevelt to Phoenix completed: May, 1909.
South Canal completed: June, 1909.
Consolidated Canal purchased: July 10, 1909.
Permanent hydro-electric power plant put in operation: August, 1909.
Eastern Canal completed: December, 1909.
Operation of cement mill ceased: August 1, 1910.
Roosevelt Dam completed February 5, 1911; formal dedication March 18, 1911.
San Francisco pumping plant completed: October, 1911.
Inspiration transmission line started: August, 1912.
South Consolidated power plant put in operation: December, 1912.
San Francisco Canal purchased: January 2, 1913.
Western Canal completed: February, 1913.
Arizona Falls power plant put in operation: May, 1913.
Highline pumping plant put in operation: June, 1913.
Entire project 94.5 per cent completed: June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Salt River project provides for the storage of water in the reservoir created by the building of the Roosevelt Dam, which is situated at the confluence of Tonto Creek and Salt River, about 78 miles northeast of Phoenix, Ariz. This stored water is carried down Salt River to a point about 4 miles below the mouth of the Verde River, where, together with such water as may be discharged by the Verde, it is diverted to the North and South Side canal systems by the Granite Reef Diversion Dam. The water supply for the canals on the North side of the river will be further augmented by the building of a permanent diversion dam at the site of the old Joint Head Dam, 2 miles west of Tempe.

As large quantities of underground water are available, the plan contemplates the irrigation of about 40,000 acres by pumping. There have been completed and put into operation 8 pumping plants with an approximate capacity each of 10 second-feet. A pumping plant located at the junction of the Western Canal and Kyrene branch will pump water through a 54-inch pressure pipe 5,930 feet long to an elevation of 40 feet and will water approximately 7,500 acres of land. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The canal and lateral system at present comprises 715 miles and on completion of the project provides for the delivery of water to each 160-acre tract of irrigable land.

A power plant located at Roosevelt generates power from stored water in the reservoir and from water delivered from the Power Canal, heading at a diversion dam in Salt River, 19 miles above the storage dam. Other power plants completed and in course of construction by the water users' association, and which will ultimately become a part of the project, are the South Consolidated, the Arizona Falls, and the Cross Cut. A portion of the power developed will be used for pumping water for irrigation and the remainder for industrial purposes.

CONSTRUCTION DURING FISCAL YEAR.

Roosevelt Dam.—Plans have been made to add 5 feet to the height of the spillways, which will increase the capacity of the reservoir 83,100 acre-feet and the area 503 acres.

Pumping plants.—Batteries D and A were finished and Battery C was 95 per cent completed. The reequipment of McQueen well was commenced.

Transmission lines.—Three miles of 10,000-volt transmission line required to connect the McQueen wells pumping plant to the 10,000-volt distributing system were completed and put into service. The terminus of the Arizona Falls transmission line, near the site of the Cross Cut power plant, was connected with the terminus of the 10,000-volt distributing system on the south side of Salt River at Tempe by means of special construction, consisting of a 1,665-foot span across Salt River carried on towers 120 feet high.

Owing to the great amount of trouble caused by hawks interfering with the power wires between Roosevelt and Mesa, and also the effects of lightning, together with a combination of other circumstances, it was considered advisable and opportune to make extensive changes on this line by incorporating in it the improvements that have been developed in the art since the line was constructed. The plans for this work were made and the material is on hand ready for active operation.

Transmission line, Roosevelt to Miami.—On August 2, 1912, a contract was entered into between the United States and the Inspiration Consolidated Copper Co. providing for the delivery of a large amount of power at the company's works near Miami. The contract provides that the company furnish the funds and construct a steel-tower transmission line about 30 miles in length, in accordance with plans and supervision provided by the Reclamation Service. When completed it will become the property of the United States, and the company will be reimbursed for its expenditure by credits on bills for electric energy furnished. The engineering and supervision were carried on and all preparations made for the final erection of the line.

Canal systems.—Work on widening the Arizona Canal was continued during the year, and 84,269 cubic yards of material were removed by the excavator. The turnouts at the Indian Bend and Evergreen wasteways were also built on this canal. On the south side the Western Canal was completed, 85,000 cubic yards of earth being removed and 9 bridges and 6 concrete structures, containing 83 cubic yards of concrete constructed.

Water users' association work.—On August 30, 1910, the water users' association entered into a contract with the United States by which the association agreed to collect and furnish about $1,000,000 for the construction of certain canals and power plants on the project. Work has been carried on since that time, but on account of various delays was not completed on August 30, 1912, as provided in the contract. The terms of the contract were accordingly modified so as to provide for completion December 1, 1913. Various delays have, however, made it necessary to further extend the contract so that provision is now made for completion on September 1, 1914. The South Consolidated and the Arizona Falls power plants have been

completed and put into operation, and a transmission line built connecting the Arizona Falls plant with the switching station. The new Cross Cut Canal has been completed. This canal is about 3½ miles long and has a capacity of 725 second-feet. At the intake end is a concrete lined fill 3,300 feet long, while another feature is a concrete flume 595 feet long. Twin pressure pipes of reinforced concrete 7 feet in diameter and 2,300 feet long connect the fore bay with the power plant. They are 80 per cent complete, and the excavation for the power plant and tailrace is well under way. This plant will develop 6,432 horsepower.

Highline Canal Construction Co.—A contract with the Highline Canal Construction Co., dated August 22, 1912, provided that the company build a pumping plant to raise water to an elevation of 40 feet for the irrigation of about 7,500 acres of land. The pumping plant consists of 3 direct-connected, motor-driven, horizontal centrifugal pumping units, each with a capacity of 20 second-feet, discharging into a manifold and thence into a reinforced concrete pressure pipe 54 inches in diameter and 5,930 feet long. A transmission line 3 miles long connecting with the distributing system delivers power at 11,000 volts. In addition, there were constructed 29 miles of canal involving the handling of 92,021 cubic yards of earth, 28 concrete and 83 wooden structures and 9 bridges.

Western Canal Construction Co.—On August 19, 1912, a contract was made with the Western Canal Construction Co. providing that the company build a canal, which is a continuation of the Western Canal, and which will irrigate approximately 13,000 acres of land. Under this contract 37 miles of canal were constructed, 154,223 cubic yards of earth being removed, and 12 concrete and 124 wooden structures and 34 bridges were built.

OPERATION AND MAINTENANCE.

Irrigation works operated during the fiscal year included the Roosevelt Reservoir, the Granite Reef Dam, the complete canal system on the north side unit; and the South, East Consolidated, and Mesa systems on the south side unit. On February 16, 1913, the entire Western Canal system was put in operation, and on June 16, 1913, the Highline, or 40-foot lift canal, was completed and operation started on the same day. The gravity system on the south side unit was augmented by such supply as could be utilized from Batteries B, D, E, and F, and the Clemans well in the Mesa district and the San Francisco well in the San Francisco district. Water was supplied to the canals on the north side unit through the Arizona Canal and to those on the south side unit through the South Canal. The total area irrigated and cultivated under the canals supplied by the Reclamation Service approximated 162,000 acres, an increase over that of the previous year of over 30,000 acres. About 30,000 more acres on the south side of the river were supplied with water through the Utah, Tempe, and San Francisco Canals, operated by their respective organizations independently of the Reclamation Service. In all approximately 190,000 acres have been irrigated, to accomplish which there were diverted from the water supply dur-

ing the year ending June 30, 1913, 770,063 acre-feet, of which approximately 462,037 acre-feet were actually applied to the land. On July 1, 1912, the elevation of the water surface in the reservoir was 170.30 feet, respecting 601,263 acre-feet of stored water, the maximum point reached during the year and on June 30, 1913, at elevation of 151.53 feet, the amount was 418,517 acre-feet. The net loss at the end of the fiscal year was 182,746 acre-feet, after satisfying extraordinary demands on the system during the months of April, May, and June, when the maximum demands were made.

Some additions have been made to the lateral systems, principally by the operation and maintenance crews. Concrete and wooden structures have been built where replacements were necessary. The total length of irrigating canals and laterals operated by the Reclamation Service on June 30, 1913, was 715 miles, as compared with 576 miles on June 30, 1912, and 534 miles on June 30, 1911. Of the 715 miles, 405 are on the north side and 310 on the south side.

The gravity supply has been materially augmented by the five batteries in operation south of Mesa and the San Francisco well, which has served materially in furnishing adequate water to the San Francisco system.

The year has been one of average run-off, and it was possible to furnish at all times an adequate supply of water for irrigation, and even take care of a larger area of land than has been in cultivation, besides furnishing a supply for lands having no appropriation in either Salt or Verde Rivers. The water has been furnished on the acre-foot basis, under water rental contracts continuing for a year, the rates being $1.10 for the first 2 acre-feet, 40 cents for the next, and 50 cents for the next, for lands signed in the association; and $1.20 for the first 2 acre-feet, 50 cents for the next, and 60 cents for the next, for lands not so signed.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Salt River project.

Item.	1909	1910	1911	1912	1913 to June 30.
Acreage for which service was prepared to supply water	130,000	150,000	160,000	160,000	180,000
Acreage irrigated	75,638	92,251	115,042	128,628	162,000
Number of farms irrigated	1,810	2,000	2,300	3,000	4,000
Miles of canal operated	464	499	534	576	715
Water stored (acre-feet) on June 30	149,245	116,537	463,742	603,970	418,517
Water diverted (acre-feet)			551,093	663,256	770,063
Water delivered to land (acre-feet)	420,000	382,000	352,699	430,928	462,037
Per acre of land irrigated (acre-feet)	4.2	3.6	3.53	3.94	3.58

SETTLEMENT.

The population of the valley is steadily increasing, and taxable property values in Maricopa County have nearly trebled between 1905 and 1912, increasing from $10,867,000 in 1905, the year in which the contract for the Roosevelt Dam was signed, to $27,599,785 in 1912.

As indicative of the number of people who have settled on the project within the past six years, the following table shows the num-

ber of transfers and of names appearing on the books of the Salt River Valley Water Users' Association:

Year ending Apr. 30—	Number of transfers.	Number of names on register.
1908	669	
1909	863	1,829
1910	791	2,130
1911	1,020	2,657
1912	1,103	3,048

These additional people represent, for the most part, the subdivisions or holdings of large landowners which are disposed of to the newcomers, and it is noted that during the past three years the increase in the number of people coming to the project has kept pace with the increase in taxable property values of the county.

PRINCIPAL CROPS.

Agriculturally the year is divided into two pronounced seasons—a summer season, devoted to the cultivation of alfalfa, sugar beets, garden trucks, sorghum, small fruits, cantaloupes, melons, etc., and a winter season, devoted principally to the cultivation of alfalfa, cereals, and citrus fruits. As a matter of convenience, the line of demarcation between these two seasons has been, up to the past year, from October 1 to May 31 for the winter season and from June 1 to September 30 for the summer season. The year was divided in this way to make the water-rental contracts conform to agricultural conditions, but the putting into effect of the new water-rental application on October 1, 1912, has served to eliminate the division into seasons, and the agricultural year continues from October 1 to September 30 of the following year. Irrigation is carried on throughout the entire year, and at no periods are the canal systems without water, except when made necessary by some extraordinary repair.

The percentage of the various crops remains practically the same, the relative increases corresponding to the increased cultivated acreage. Ninety per cent of the cultivated land is devoted to alfalfa, grain, and pasture, the remaining 10 per cent being distributed over a wide range of products. The past year has been one of undoubted success in crop production on the project, with the exception of citrus fruits, all groves having been seriously damaged by the exceedingly cold weather of the past winter. In consequence a light crop of citrus fruits will be harvested this year. Grain crops will be average, although in many sections exceedingly good yields are being reported. Excellent crops of alfalfa are being harvested. Prices for both alfalfa and grain are good, and this particular year promises to be the best that the Salt River Valley has ever enjoyed.

Crop statistics, Salt River project, June 1, 1911, to May 31, 1912.

	Acreage irrigated or cropped.
Alfalfa	68,900.5
Alfalfa and grain (mixed hay)	13,816.5
Barley	24,761.0

	Acreage irrigated or cropped.
Beets	2,884.0
Cantaloupes	1,163.0
Fruit:	
Deciduous	1,071.5
Citrus	1,340.0
Garden	1,596.0
Kaffir corn and milo maize	1,160.5
Oats	4,840.5
Pasture	19,568.0
Sorghum	1,028.0
Wheat	12,049.5
Miscellaneous	1,517.0
Total cropped	155,696.0
Other purposes	3,474.0
Total irrigated	[1] 159,170.0

GILA RIVER INDIAN RESERVATION.

No work was performed by the Reclamation Service on the reservation during the fiscal year, and the following information was secured from the Indian Office:

In the Santan district the Indians used the river water up to May 9, since which time the river has been entirely dry, and well water, from such wells as have been connected up with the irrigation ditches, has been used instead by about half of the farmers for maturing their crops. No bad effects to the soil have so far been noticed as a result of the use of well water, and it is not anticipated that any will occur as long as the Indians can be prevailed upon to use the water intelligently. The prejudice against the use of well water is gradually subsiding. The construction of laterals has progressed to the extent that it is now possible to furnish well water to the 4,000 acres now under cultivation in the Santan district.

FINANCIAL STATEMENTS.

Assets and liabilities Salt River project, June 30, 1913.

ASSETS.

Accounts receivable:			
Water rentals		$3,264.00	
Miscellaneous rentals	$17,666.25		
Rentals for water for power purposes	1,255.71		
		18,921.96	
Miscellaneous		10,507.13	
			$32,693.09
Inventories:			
Equipment in use—			
Animals	8,052.92		
Mechanical and other	44,752.73		
		52,805.65	
Materials, supplies, etc., in storehouses		169,586.70	
Cement		6,735.27	
Undistributed cost (freight and handling on inventory property)		7,381.01	
			236,508.63

[1] Entire valley, including 86,583 acres North Side system; 42,045.5 acres South Side system; and 30,541.5 acres independent systems.

Improvements to land:			
Gross cost		$11,193,686.86	
Less credits from incidental operations—			
Rentals of cottages	$5,436.37		
Rentals of grazing lands	18,806.14		
Rentals of power and light	302,334.88		
Rentals of irrigation water	861,965.11		
Revenues, miscellaneous	6,164.69		
Profits, mess	16,571.18		
Profits, mercantile stores	2,609.37		
Adjustments—			
Contractors' freight refunds	8,388.14		
Forfeitures by defaulting bidders and contractors	3,280.00		
		1,225,555.88	
			$9,968,130.98
Total assets			10,237,332.70

LIABILITIES.

Accounts payable:			
Labor		$24,319.82	
Purchases		13,556.64	
Contract estimates		30,189.00	
Contract holdbacks		10,374.85	
Freight and express		12,738.65	
Passenger fares		45.96	
Land agreements		1,178.50	
Miscellaneous		28.66	
			92,432.08
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	$100,000.00		
Building advance collections	50,664.83		
		150,664.83	
For depreciation on plant and equipment		92,147.89	
			242,812.72
Unadjusted credits:			
Net earnings of Government animals			18,766.49
Net investment—			
Disbursement vouchers	$11,422,716.83		
Transfers received	314,514.26		
		11,737,231.09	
Less—			
Collection vouchers	1,799,870.34		
Transfers issued	54,039.34		
		1,853,909.68	
			9,883,321.41
Total liabilities			10,237,332.70

Feature costs, Salt River project, to June 30, 1913.

Storage works:		
Roosevelt Dam	$3,191,235.65	
Sluicing tunnel	124,395.56	
Hydraulic gates	249,841.27	
Reservoir, clearing site, moving camp, etc	24,926.01	
Outlet tunnel	58,429.18	
Lands submerged by reservoir	152,415.79	
		3,801,243.46
Power system:		
Diversion dam, Livingston	127,353.22	
Power canal, construction and maintenance	1,272,529.27	
Power canal, settling basin	18,095.32	

Power system—Continued.		
Penstock tunnel (lining)	$73,058.76	
Auxiliary penstock (from power canal)	8,319.69	
Installing machinery, hydro-electric power plant, Roosevelt	180,011.44	
Hydro-electric power plant, building No. 1	148,488.52	
Hydro-electric power plant No. 2 (South Consolidated)	26,886.32	
Dam penstock	100,957.22	
Transformer house (Roosevelt)	136,731.41	
Transmission line, 40,000 volt (Roosevelt-Phoenix)	360,344.21	
Switching station plant	40,078.87	
Substation, No. 1 plant (8 miles south of Mesa)	30,659.50	
Transmission line, secondary, 10,000 volt, Mesa district	51,902.40	
Phoenix substation plant	12,789.46	
Transmission line, secondary, 10,000 volt, Phoenix district	9,232.46	
Glendale substation	8,358.30	
Highline transmission line	225.31	
Granite Reef transmission line	2,494.11	
McQueen well transmission line	5,694.71	
Operation of power system	170,764.86	
		$2,784,975.36
Diversion works:		
Granite Reef Dam	623,344.60	
Joint Head Dam	374.00	
		623,718.60
North Side canal system:		
Construction (includes purchase price)	1,173,441.87	
Operation and maintenance	684,142.65	
		1,857,584.52
South Side canal system:		
Construction (includes purchase price)	758,478.04	
Operation and maintenance	272,992.00	
		1,031,470.04
Government well drilling:		
Construction	149,873.99	
Operation and maintenance	15,126.53	
		165,000.52
Plant account, miscellaneous plants and buildings		101,713.65
Real estate rights and property, lands purchased (not submerged)		33,202.60
Irrigable lands, farm unit plats		12,993.29
Telephone system, construction		69,004.70
Roads:		
Roosevelt-Phoenix, construction	350,644.11	
Extension, approach to dam, construction	13,530.55	
Roosevelt-Phoenix, maintenance	67,918.97	
Highline to Globe	93,952.18	
Tonto	78,909.56	
Miscellaneous	14,231.87	
		619,187.24
Examination of project as a whole:		
Agua Fria cement investigation	833.50	
Underground water supply	16,201.64	
Surveys	42,985.23	
Investigation Salt River Valley	4,512.69	
Hydrography	13,023.07	
General reconnoissance	83.86	
Water analysis	2,274.87	
Verde reconnoissance	4,024.97	
		83,939.83
Inventory cost ledger supplies		9,653.05
Total building cost		11,193,686.86

Estimated cost of contemplated works, Salt River project.

Raising spillways, Roosevelt Dam	$4,000
Building Joint Head Dam	33,500
Reequipment of McQueen well	7,700
Reconstruction, Mesa-Roosevelt transmission line	52,100
Installing gates, South Canal	1,500
	98,800

ARIZONA-CALIFORNIA, COLORADO RIVER PROJECTS.

IRRIGATION PLAN.

The Colorado River projects consist of a number of possible irrigable developments on the lower Colorado River in Arizona and California, the principal of which are the Blythe-Parker and Needles projects. The irrigation plan of these projects provides in general for the diversion of water from Colorado River for irrigation of lands near the river; the diversion for the Blythe-Parker project being made at Headgate Rock, near Parker, Ariz., about 120 miles above Yuma, and the diversion for the Needles project being made a few miles north of Mohave City, Ariz., and about 200 miles above Yuma. The normal low-water supply of Colorado River is insufficient for present satisfactory irrigation of these projects, and their success therefore will depend on the storage of water in the drainage areas of the Grand and Green River systems, forming the Colorado River.

INVESTIGATIONS.

In 1903 topographic surveys were made of the lands along the Colorado River from the Mexican border to about 100 miles north of Needles. Beginning in 1904 and continuing intermittently to the present time, preliminary examinations and surveys of reservoir sites on the Grand and Green River systems have been made as follows: The Kremmling, Windy Gap, and Lehman, on the Grand River; the Grand Lake, at the head of the North Fork of Grand River; the Flaming Gorge, Island Park, and Browns Park, on Green River; and two sites on Yampa River, a tributary of Green River. Diamond-drill and wash borings at the proposed dam site for Browns Park Reservoir were begun in the summer of 1907 and continued through the seasons of 1908 and 1909.

No investigations have been made during the fiscal year ending June 30, 1913.

FEATURE COSTS TO JUNE 30, 1913.

Preliminary examination and surveys	$43,710

ARIZONA-CALIFORNIA, YUMA PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Yuma, Ariz.; Imperial, Cal.

Townships: 3 to 13 S., Rs. 21 to 25 W., Gila and Salt River meridian; 9 to 17 S., Rs. 16 to 23 E., San Bernardino meridian.

Railroad: Southern Pacific.

Railroad stations and estimated population January 1, 1913: Yuma, Ariz., 3,500; Potholes, Cal., 25.

WATER SUPPLY.

Source of water supply: Colorado River.

Area of drainage basin: 229,000 square miles above Laguna Dam.

Annual run-off in acre-feet of Colorado River at Yuma (287,000 square miles), 1902 to 1912: Maximum, 25,900,000; minimum, 7,960,000; mean, 16,700,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 50,000 acres.

Area under water-right applications and rental contracts, season of 1913: 25,850 acres.

Length of irrigating season: 365 days.

Elevation of irrigable area: 100 to 300 feet above sea level.

Average annual rainfall on irrigable area: 2½ inches.

Range of temperature on irrigable area: 22° to 118° F.

Character of soil of irrigable area: Bottom lands, rich alluvium; mesa lands, Fresno gravelly sand.

Principal products: Semitropical fruits, alfalfa, grain, cotton.

Principal markets: Los Angeles and San Francisco, Cal.; Arizona towns; eastern markets for early produce.

LANDS OPENED FOR IRRIGATION.

Date of public notices: January 12, 1910; March 8, 1912; March 6, 1913; June 23, 1913.

Location of lands opened: Ts. 15 and 16 S., R. 23 E., San Bernardino meridian.

Present status of irrigable lands opened: 6,503 acres entered, subject to the reclamation act and the act of April 21, 1904.

Limit of area of farm units: Public, 40 acres.

Duty of water: 5½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $55 and $66.

Annual operation and maintenance charge: $1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers April 8, 1904.

Construction authorized by Secretary May 10, 1904.

Canal system of Colorado Valley Pumping & Irrigating Co. purchased March 15, 1907.

First irrigation by Reclamation Service, season of 1907.

Canal system of Yuma Valley Union Land & Water Co. (Farmers' Gravity Canal) purchased February 3, 1908.

Rollins ditch (including Ives heading pumps and ditches) purchased July 23, 1908.

Laguna Dam completed March, 1909.

Colorado River siphon completed June 29, 1912.

Gravity water from Laguna Dam furnished to Yuma Valley through siphon June 29, 1912.

Entire project 78.5 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Yuma project provides for the diversion of water from the Colorado River at the Laguna Dam, 10 miles northeast of Yuma, Ariz., into two canal systems—one heading on the California side, conveying water to the irrigable lands on that side of the river, including those in the Yuma Indian Reservation, crossing the river at Yuma through an inverted siphon and serving lands in the Colorado Valley below Yuma, and the other heading on the Arizona side of the stream and watering lands in the Colorado and Gila Valleys lying east of the Colorado and north of the Gila. The plan also provides for a large pumping plant about 2½ miles below Yuma on the East Main Canal for raising water to irrigate 40,000 acres of mesa land; and

for a small pumping plant at the terminus of the gravity canal on the Arizona side of the river below Laguna Dam for raising the water through a small lift to irrigate about 6,000 acres. The lands adjacent to the Gila and Colorado Rivers are protected from overflow of these streams by means of levees. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and proposes to use such water in connection therewith. The Laguna Dam, 222½ miles of canals and laterals, 10 miles of drainage ditches, the Colorado River siphon, 930 feet in length and 14 feet in diameter, and about 70 per cent of the levee system are completed.

CONSTRUCTION DURING FISCAL YEAR.

Laguna Dam.—A small force has been employed for a portion of the fiscal year overhauling machinery and protecting river banks at both ends of the dam from erosive currents. During July and August, 1912, and April, May, and June, 1913, quarries on the California side were operated to furnish rock for river-front protection on the Yuma Indian Reservation.

Colorado River siphon.—This structure was opened to service on June 29, 1912, since which date it has been in successful operation. During the fiscal year a road was graded around the outlet end and the concrete work at this point completed. The siphon was formally dedicated by the people of Yuma and vicinity at a three-day celebration in November, 1912.

Canals.—Yuma Indian Reservation. One and one-half miles of small laterals, containing 16,240 cubic yards, have been constructed by Government forces. There have also been built the following wooden structures: Two bridges, 19 checks, 22 turnouts, and 10 culverts; also 3 concrete turnouts and 1 concrete culvert.

Yuma Valley.—Twenty-six and one-half miles of canal, containing 278,300 cubic yards, have been completed by Government forces, and 10½ miles, containing 106,400 cubic yards, were built by contract. The following wooden structures were built: Twenty-four bridges, 100 culverts, 80 checks, and 191 turnouts; also 1 large concrete check.

Gila Valley.—One mile of canal, containing 11,800 cubic yards. was completed by Government forces, and 4½ miles, containing 58,560 cubic yards, were built by contract. The following wooden structures were completed: Three bridges, 7 checks, 13 turnouts, and 3 culverts; also 1 concrete check. A producer gas plant and pump, which had been in service at Yuma, were moved to the Gila Valley district and installed for pumping to about 1,800 acres.

Drainage.—One Monighan, type A, drag-line scraper was placed in commission on the reservation drainage in the middle of January, 1913, and a similar machine began operations on the same feature the 1st of April. At the close of the fiscal year these machines had excavated 106,500 cubic yards from 9.85 miles of channel. These channels are from 6 to 12 feet wide on the bottom, the depth of excavation varying from 2 to 8 feet. In addition, 32,475 cubic yards of excavation above ground-water level were removed by scraper teams under small contracts with the farmers in advance of the drag-line work. In connection with this drainage work there have been built the following wooden structures: Seven bridges, 5 flumes, and 1 culvert; also 1 concrete culvert.

Levees.—No levees were constructed during the fiscal year, except a temporary embankment on the Arizona side about 16 miles below Yuma. Here some 30,000 cubic yards—about 4,000 feet of levee—

were thrown up to close a gap where the levee had been cut out by a caving bank.

River-front protection.—One permeable dike (spur dikes constructed of piles, brush, and earth) was built on the Arizona side of the river about 5 miles below Laguna Dam; also a similar dike on the California side about 2 miles below the first. Three and four-tenths miles of narrow channels were cut across sand bars to assist in turning the river away from threatened points. During July and August, 1912, and April, May, and June, 1913, about 100,000 cubic yards of rock obtained from quarries at the California end of Laguna Dam were used in blanketing the reservation levee at threatened points.

OPERATION AND MAINTENANCE.

Yuma Valley.—On June 29, 1912, water was diverted through the Colorado siphon at Yuma to supply the new canals constructed in the Yuma Valley, which is located on the Arizona side of the Colorado River south of Yuma, thus increasing the area for which the service could supply water from approximately 10,000 to 36,000 acres. There are between 50,000 and 55,000 irrigable acres in this unit, approximately 13,500 acres of which are now under cultivation. About 300 acres of land adjacent to the town of Yuma, which is too high to be supplied by gravity water through the siphon, are being irrigated from the old Farmers' pumping plant located at Yuma. The Scoop Wheel and the Rollins pumping plant, which operated in connection with the Farmers' pump, prior to delivery of water through the siphon, have been dismantled. The valley is receiving water on a rental basis, at the rate of 50 cents per acre-foot delivered. Owing to the fact that the same number of miles of canals (viz, 120 miles) are being operated and maintained to irrigate the area now under cultivation that would be operated were the 36,000 acres in crop, and also in view of the fact that the canals are new, the patrol and maintenance item has been heavy. Water is delivered on a seven-day rotation system, being run to the end of all laterals and the lands applying for water irrigated in turn up the laterals. Enough water is put into the system on the first of each week to accommodate within the seven-day period the lands to be irrigated.

Reservation.—In March, 1910, 6,500 acres of land, comprising 173 farm units on the California side of the Colorado River, northeast of Yuma, were opened under public notice, and approximately 3,500 acres are now under cultivation. Water is served to this unit of the project through 54.5 miles of canals, the main diversion being about 1½ miles below Laguna Dam from the main California canal. The operation and maintenance charge is $1 per acre, and water is delivered on a seven-day rotation system. Owing to the construction of 10 miles of drainage canals in this unit and also the fact that the spring flood in the Colorado River did not reach the usual gage height, seepage conditions were not serious this season. In addition to the maintenance work necessary for the upkeep of the canal system, extensive rock protection along the levee was carried on during the flood period. On the 8,500 acres set aside for the Indians, about 16 miles of canals have been constructed, which will accommodate approximately 3,000 acres. Only about 100 acres of this area are as yet under cultivation.

North Gila Valley.—In the North Gila Valley unit, the area of which will amount to between seven and ten thousand acres, depending upon future levee location, 18.5 miles of canal have been constructed, which would irrigate 4,500 acres. Of this area about 550 acres are now under cultivation. Water is diverted from Laguna Dam on the Arizona side, augmented by a pumping plant at the end of the Arizona main canal, to handle 1,800 of the 4,500 acres for which the service is ready to supply water. The seven-day rotation system is in operation in the Gila Valley. This unit is on a rental basis, 50 cents an acre-foot being collected. No canals have as yet been constructed to accommodate the South Gila Valley unit, comprising some 10,000 to 12,000 acres.

For "Summary of operation and maintenance results," see Appendix, p 334.

There follows an historical review of the project for the years 1909 to June 30, 1913:

Historical review, Yuma project.

Item.	1909	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	7,000	16,000	16,000	16,000	50,000
Acreage irrigated	7,000	10,000	10,000	13,767	17,650
Number farms irrigated	289	440	447	470	570
Miles canals operated	157	157	157	162.5	222.5
Water diverted (acre-feet)	48,943	42,018	71,563	96,409	60,550
Water delivered to land (acre-feet)	34,019	31,057	54,346	63,273	42,878
Acre-feet per acre of land irrigated	4.85	3.10	5.43	4.6	2.43

SETTLEMENT.

All but one of the 173 farms in the reservation, opened under public notice in March, 1910, are occupied. The records show the following number of relinquishments with assignment of credit: 1910, 68; 1911, 17; 1912, 10; 1913, 4; also 1 unit has been relinquished to the Government.

With the exception of the small area under cultivation on the lands allotted to Indians, the balance of the project is on a rental basis.

Taking the project as a whole, there were, in 1912, 13,767 acres under cultivation, comprising 470 farms, with an average population of 3.2, or a total population on farms of 1,504. To the end of June, 1913, the area cultivated has been increased to 17,650 acres, comprising 570 farms, or a population of 1,824. When the entire project is brought under cultivation it is estimated that approximately 3,500 farms will receive water from the service, with a farm population of 11,200. In addition, the town of Yuma, located within the project, has a population at the present time of probably 3,500 people.

PRINCIPAL CROPS.

As will be seen from the statement below, alfalfa hay and alfalfa seed are the principal crops now raised on this project, about 70 per cent of the entire irrigated area being planted to alfalfa. During the past few months many dairy cattle have been brought to the project; a creamery has been established at Yuma, and it is anticipated that the industry will grow until it is the principal one on the project.

Crop statistics, Yuma project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa hay	7,269	Ton	27,078	$270,780.00
Alfalfa seed	2,824	Pound	814,186	81,418.60
Alfalfa straw	2,824	Ton	3,000	15,000.00
Milo maize	986	Bushel	31,372	23,529.00
Barley hay	208	Ton	416	3,744.00
Wheat and barley grain	1,567	Bushel	55,357	41,517.75
Indian corn	294	Bushel	6,602	4,951.50
Sorghum	292	Ton	1,252	6 260.00
Cotton	25	Pound	5,800	1,160.00
Truck	431	Acre		19,902.00
Pasture	575	Acre		28,750.00
Less duplicated area	6,235			
Total cropped	11,060			497,012.85
Irrigated but not cropped	2,707			
Total irrigated	13,767			

ORDER DATED MARCH 6, 1913.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts supplemental thereto and amendatory thereof, the following order is hereby issued for the relief of settlers on the Yuma project, California-Arizona, viz:

The portion of the installment for building the irrigation system due December 1, 1911, on any entry or water-right application, is hereby reduced to 50 cents per acre of irrigable land, and the balance of said portion of the installment due December 1, 1911, shall be divided into two equal parts and added to the ninth and tenth installments; provided that this notice shall not apply to entries or water-right applications on which two or more installments of the building charge theretofore due and remaining unpaid on November 30, 1912, shall still remain unpaid on April 1, 1913, or upon which any portion of an installment for operation and maintenance theretofore due remained unpaid on November 30, 1912. The time for payment of the portion of the installment for operation and maintenance due December 1, 1912, is hereby extended to August 1, 1913.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Assets and liabilities, Yuma project, to June 30, 1913.

ASSETS.

Cash:		
In special fiscal agent's possession		$233.60
Accounts receivable:		
Freight refunds	$0.25	
Water rentals	4,522.45	
Miscellaneous	183.69	
Water rights, building charges	93,378.47	
Water rights, operation and maintenance charges	12,860.75	
		110,945.61

Inventories:			
Mercantile stores		$118.91	
Equipment in use—			
Animals	$12,872.00		
Mechanical and other	176,949.96		
		189,821.96	
Material and supplies in storehouse		91,310.37	
Cement		4,573.35	
Structural steel and iron		2,427.93	
Lumber		5,603.69	
Forage		973.04	
Fuel		1,161.84	
Unadjusted transfers between projects		3,514 26	
Freight and handling		9,681.20	
			$309,186.55
Improvements to lands:			
Gross cost		6,307,890.79	
Less credits for—			
Irrigation, water	$173,399.10		
Revenue, miscellaneous	2,439.25		
Mess, net results	4,516.48		
Mercantile store, net results	55,416.78		
Contractor freight refunds	18,506.11		
		254,277.72	
			6,053,613.07
Deferred operation and maintenance revenues			77,117.09
			6,551,095 92

LIABILITIES.

Accounts payable:			
Labor		$5,945.60	
Purchases		18,904.56	
Freight and express		16,892.72	
Passenger		347.00	
Land agreements		16,605.96	
Coupons		382.25	
Meal tickets		207.60	
Miscellaneous		679.00	
			59,964 69
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	$228,729.53		
Building charges advance collections	207.00		
Building charges forfeited	474.50		
		229,411.03	
Depreciation on plant equipment		7,201.91	
			236,612.94
Unadjusted credits:			
Net earnings Government animals			43,624.28
Net investment—			
Disbursement vouchers	$6,575,439.60		
Transfer vouchers received	174,731.07		
		6,750,170.67	
Less—			
Collection vouchers	463,876.18		
Transfer vouchers issued	75,400.48		
		539,276.66	
			6,210,894.01
			6,551,095.92

Feature costs, Yuma project, to June 30, 1913.

Excavation, class 3	$638,807.49	
Excavation, class 3	$638,897.49	
Excavation, class 2	134,143.42	
Rock in dam	208,059.81	
Concrete core wall	177,905.03	
Rock paving	9,175.53	
Concrete paving	246,619.60	
Sheet piling upper wall	39,095.12	
Sheeting for lower walls	3,434.90	
Clearing above dam	177.76	
Cofferdam	90,816.66	
River front protection	31,021.19	
Rock training dike	5,355.85	
Flood expense	57,087.89	
Diking and ditching at toe	17,555.89	
Preliminary and suspense expense	5,537.77	
Clearing face dam and razing cofferdam	7,374.29	
Repairs and maintenance	662.20	
		$1,672,830.40
Sluice and regulator works:		
Sluice-gate excavation	519.44	
Sluice-gate pier and abutments, construction	52,878.58	
Sluice and regulator gates, installation	77,068.62	
Sluice walls and lining	82,216.73	
Sluiceway paving	22,623.05	
Bridges	10,124.76	
Canal heading, walls, and lining	25,865.30	
Sluiceway excavation	26,387.52	
Power house	17,806.44	
Sluiceway protection and repairs	35,853.19	
Sluice-gate protection and repairs	157.02	
Modification of regulator gates	324.11	
		351,824.76
Distribution system:		
Reservation canals	311,579.14	
Arizona canals	152,965.25	
Yuma main canal (California)	579,676.46	
Colorado River siphon	676,253.71	
Yuma Valley	581,569.91	
		2,302,044.47
Protective system:		
Gila Valley levees	170,559.43	
Yuma Valley levees	306,733.34	
Reservation levees	269,736.56	
		747,029.33
Drainage system		32,757.24
River front protection:		
Reservation	174,297.65	
Arizona	49,843.23	
Yuma Valley	131,487.01	
		355,627.89
Surveys:		
Preliminary to selection of project	124,837.05	
After selection of project	54,704.20	
		179,541.25
Real estate, lands purchased, etc		132,751.20
Miscellaneous construction:		
Prior to 1907	99,226.90	
Since 1907	75,223.08	
		174,449.98

Operation and maintenance (during construction):		
Steam plant	$111,390.07	
Gravity plant (wheel)	124,709.18	
Pumping plant No. 3	56,594.06	
Yuma Valley	62,506.01	
Gila Valley	3,353.14	
		$358,552.46
		6,307,408.98
Inventory of cost ledger supplies		481.81
Total building cost		6,307,890.79
Operation and maintenance:		
Maintenance dam	3,392.28	
Maintenance sluiceways	34,913.81	
Operation gates	1,882.56	
Maintenance gates	1,230.09	
Operation reservation	17,559.55	
Maintenance reservation	29,668.05	
Construction drainage	37,753.27	
Operation drainage	977.70	
Maintenance drainage	384.78	
		127,762.09
Total building and operation and maintenance cost		6,435,652.88

Operating revenues and expenses, Yuma project, to June 30, 1918.

EXPENSES.

Distribution:		
Operation	$19,442.11	
Maintenance	69,204.23	
		$88,646.34
Drainage:		
Operation	977.70	
Maintenance	38,138.05	
		39,115.75
Total		127,762.09

REVENUES.

Operation and maintenance, accruals	50,062.00
Operation and maintenance, forfeitures	79.00
Rentals, land and buildings	504.00
Deferred operation and maintenance revenues	77,117.09
Total	127,762.09

Estimated cost of contemplated work, Yuma project.

Yuma Valley distribution system: Completing west main with laterals and structures to 10-mile point on levee and construction of wasteway from west main canal at north line of sec. 36, T. 9 S., R. 23 W., to Mexican boundary line	$250,000.00
Levee from Laguna Dam to Gila River, with protection work	308,375.00
First unit on Mesa	500,000.00
River front protection on reservation	25,000.00
Drainage on reservation	30,000.00
Operation and maintenance	80,070.00
Total	1,193,445.00

CALIFORNIA, ORLAND PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Glenn and Tehama; reservoir in Colusa County.
Townships: 21 to 23 N., Rs. 2 to 4 W., Mount Diablo meridian.
Railroads and other transportation lines: Southern Pacific Railroad and steamers on Sacramento River.
Railroad station and estimated population, January 1, 1913: Orland, 1,200; Greenwood, Malton, and Wyo, flag stations.

WATER SUPPLY.

Source of water supply: Stony Creek.
Area of drainage basin: Above diversion dam, 735 square miles; above East Park Dam, 102 square miles.
Annual run-off in acre-feet: Stony Creek, near Fruto (601 square miles), 1907 to 1912, maximum, 940,000; minimum, 135,200; mean, 497,500. Little Stony Creek at East Park Dam (102 square miles), 1907 to 1912, maximum, 170,800; minimum, 12,600; mean, 72,600.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 14,307 acres.
Area under rental contracts, season of 1913: 6,312 acres.
Length of irrigating season: From April 1 to October 31 (214 days).
Average elevation of irrigable area: 225 feet above sea level.
Average annual rainfall on irrigable area: 17 inches (1912–13, 14.75 inches).
Range of temperature on irrigable area: 26° to 114° F.
Character of soil of irrigable area: Sandy and gravelly loam, silt loam.
Principal products: Alfalfa, citrus, and other fruits and vegetables.
Principal markets: San Francisco, Cal.; Portland, Oreg.; eastern markets.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1906.
Construction recommended by board of engineers November 12, 1906.
Construction authorized by Secretary October 5, 1907.
Miller Buttes concrete headworks for South Canal completed November, 1908.
Canal system of Stony Creek Irrigation Co. purchased May 21, 1909.
Lemon Home Canal purchased March 26, 1910.
East Park Dam completed July 31, 1910.
First irrigation by Reclamation Service, season of 1910.
Construction of south side lateral system and Highline Canal completed April, 1911.
Entire project 85½ per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Orland project provides for the storage of water in a reservoir controlled by East Park Dam on Little Stony Creek, at a point about 40 miles southwest of Orland, Cal., and the diversion of water from Stony Creek at Miller Buttes, 9½ miles northwest of Orland, into two canal systems, one on either side of the creek, for the irrigation of lands in the vicinity of Orland. The South Canal system is to irrigate approximately 8,000 acres and the North Canal 6,000 acres, and in each a purchased canal system is incorporated. The plan also includes a high-line canal, from which power may be developed for the irrigation of 3,000 acres by pumping ground water. The United States intends, for and in connection with the project, to use the waste, seepage, spring and percolating water arising within the same, and asserts a right

thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

Work now under way or to be undertaken in the near future includes the building of a diverting weir in Stony Creek at the North Canal headgates, the construction of a small number of distribution structures, and the placing of additional concrete lining in the lateral system. Surveys and investigations were undertaken during the last quarter of the year looking to the increase of the storage possibilities at East Park.

The present limits of the Orland project may be considered as a unit of the Sacramento Valley project. It may be extended by constructing additional reservoirs on Stony Creek and its tributaries. The chief additional reservoir sites available are Millsite, on Stony Creek, near Fruto; Briscoe, on Briscoe Creek, near Elk Creek; Stonyford, on Stony Creek, at Stonyford; and Stony Gorge, on Stony Creek, near Elk Creek.

CONSTRUCTION DURING FISCAL YEAR.

The following construction work was done during the year:

Structures:		
Truss fence crossings, highline		3
Farm and lateral turnouts		26
Checks and drops		9
Timber deck and pipe bridges		8
Concrete spillways		1
Weir (for measuring discharge of South Canal)		1
Culverts		12
Pipe lines:		
18-inch	linear feet	234
24-inch	do	2,115
Canal lining	square yards	22,611
Product of pipe yard:		
12-inch	linear feet	536
18-inch	do	396
24-inch	do	2,396

OPERATION AND MAINTENANCE.

The irrigation works operated since the season of 1910 include the East Park Reservoir and the diversion works and distribution systems on the north and south sides of Stony Creek. For "Summary of operation and maintenance results," see Appendix, p. 334. Following is a review of the water operations of the project:

Historical review, Orland project.

Item.	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to furnish water	2,000	14,000	14,200	14,300
Acreage irrigated	700	2,663	4,230	6,312
Number of farms irrigated	48	137	211	230
Miles of canal operated	22	64	88	90
Water stored (acre-feet) maximum	.....	47,000	25,000	14,800
Water diverted (acre-feet)	4,800	39,200	34,000	29,000
Water delivered to land (acre-feet)	2,400	10,355	16,702	13,000
Per acre of land irrigated (acre-feet)	3.4	3.9	3.97	2.06

SETTLEMENT.

Practically all of the irrigable land in the project is in private ownership and has been subdivided into units of 40 acres or less. Little developed land has changed hands, and there are few instances of those who have purchased and improved land selling their hold-

ings and leaving the project. The number of farms irrigated has increased from 48 in 1910 to 230 in 1913, and the population living on farms from 128 to 700.

PRINCIPAL CROPS.

The present leading industry of the project is the production of alfalfa and dairying. During the first three months of 1913 the number of dairy stock on the project doubled and the dairy business assumed such proportions as to necessitate the building of an additional creamery, at an approximate cost of $40,000. There was a marked increase in the acreage planted to citrus fruits and nuts.

Crop statistics, Orland project, calendar year 1912.

Crop.	Acres irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa, old	593.00	Ton	4,151.0	$31,620.62
Alfalfa, 1911	1,384.00	do	4,844.0	36,911.28
Alfalfa, 1912	1,488.00	do	744.0	5,669.28
Alfalfa pasture	158.25	Acre		3,196.65
Alfalfa pasture[1]	2,390.00	do		5,736.00
Alfalfa seed[1]	49.00	Pound	2,200.0	396.00
Kaffir corn	32.00	Ton	35.9	743.13
Field corn	6.00	do	5.5	165.00
Sweet corn	6.50	Sack	655.0	694.30
Beans	4.00	Hundredweight.	32.0	112.00
Onions	2.50	do	250.0	150.00
Sweet potatoes	3.00	do	255.0	510.00
Garden, home, and market	[2] 41.60			4,980.70
Strawberries	1.20	Pounds	5,611.0	701.38
Black and Logan berries	2.20	do	7,370.0	545.38
Almonds	77.50	Ton	36.0	9,623.50
Deciduous fruits	7.70	do	24.0	720.00
Olives	5.40	do	9.8	1,225.00
Oranges and grapefruit	36.00	Box	2,780.0	4,475.80
Lemons	10.00	do	710.0	1,668.50
Nursery	3.00			3,080.00
Less duplicated areas	2,596.00			
Total cropped	3,704.85			112,924.52
Other purposes	525.15			
Grand total irrigated	4,230.00			

[1] Duplicated area.

[2] 20 acres home and 21.6 acres market garden.

FINANCIAL STATEMENTS.

Assets and liabilities, Orland project, June 30, 1913.

ASSETS.

Inventories:			
Equipment in use—			
Animals	$485.00		
Mechanical and other	9,357.10		
		$9,842.10	
Materials, supplies, etc., in storehouse		251.83	
Cement		2,203.50	
Structural iron and steel		484.09	
Lumber		366.52	
Forage		140.08	
Fuel		8.56	
Products of local operations		[1] 21.39	
Unadjusted transfer between projects		100.00	
			$13,375.29

Improvements to land:			
Gross cost		$600,207.46	
Less credits from incidental operations—			
Rentals of cottages	$624.00		
Rentals of grazing lands	2,614.00		
Rentals of irrigation water	33,445.75		
Revenues, miscellaneous	1,104.42		
Profits on mess operations	14.97		
Profits on mercantile stores	[1] 6.51		
Adjustments—			
Contractor's freight refunds	221.35		
Forfeitures by defaulting bidders and contractors	1,725.00		
		39,742.98	
			$560,464.48
Total assets			573,839.77

LIABILITIES.

Accounts payable:			
Labor		$1,199.17	
Purchases		54.24	
Freight and express		511.41	
Passenger fares		48.25	
Land agreements		357.50	
Miscellaneous		660.30	
			2,830.87
Unadjusted credits, net earnings of Government animals			158.31
Reserves, for depreciation on plant and equipment			197.15
Net investment:			
Disbursement vouchers	$583,692.08		
Transfers received	33,868.15		
		617,560.23	
Less—			
Collection vouchers	42,894.14		
Transfers issued	4,012.65		
		46,906.79	
			570,653.44
Total liabilities			573,839.77

Feature costs, Orland project, to June 30, 1913.

Storage works:		
East Park reservoir survey	$4,060.84	
East Park dam, spillway, and dikes	155,427.82	
East Park spillway, extension	28,203.60	
Stripping reservoir site	88,469.02	
Stonyford reservoir examination	128.28	
Millsite reservoir examination	328.21	
Surveys for additional storage	2,506.32	
		$279,124.09
Diversion system headworks:		
Diversion dam	7,403.45	
South Canal conduit	1,707.88	
Head gates, south side diversion	4,242.55	
Sluiceway, south side diversion	5,049.76	
Excavating plant	4,916.21	
North side diversion weir	121.33	
Head gates, north side diversion	3.50	
		23,444.68
Canal systems (including purchase price):		
North main canal	22,380.00	
South main canal	51,147.14	
Highline Canal	19,852.25	
Priming South Canal	53.29	
Lining Highline Canal	1,899.98	
		95,332.66

[1] Deduct.

Lateral systems:		
North side lateral excavation	$28,152.49	
South side lateral excavation	31,079.96	
Priming laterals	609.39	
Lining laterals	10,919.12	
Extension lateral No. 12, excavation	205.75	
Extension lateral No. 12, lining	989.81	
		$71,956.52
Structures:		
Fence crossings, Highline Canal	132.48	
Spillways, North Canal	663.61	
Checks and drops, North Canal	627.42	
Special structures, North Canal	766.30	
Special structures, South Canal	3,083.19	
Checks and drops, South Canal	3,870.76	
Railroad crossings, South Canal	673.45	
Deck bridges, over 10-foot span, South Canal	386.82	
Deck bridges, Highline Canal	157.75	
Pipe culverts, Highline Canal	1,067.96	
Flume, Highline Canal	3,461.55	
By-pass chute, Highline Canal	2,178.28	
Pipe culverts, 12-inch	94.65	
Hambright protection works	286.94	
Hall weir	272.08	
Pipe bridges	4,877.52	
Spillways	619.81	
Special structures, lateral system	422.83	
Checks and drops, lateral system	16,366.93	
Turnouts for farms	11,643.04	
Railroad crossings	6,251.43	
Deck bridges over 10-foot span	870.37	
Deck bridges, 5 to 9 foot span	2,986.96	
Turnouts for laterals	819.75	
Pipe lines, 12-inch	306.12	
Pipe lines, 18-inch	321.52	
Pipe culverts, 18-inch	1,321.61	
Highway concrete bridges	778.53	
Pipe culverts, 12-inch, lateral system	103.45	
Pipe culverts, 24-inch, lateral system	164.52	
Timber turnouts for farms	91.03	
Timber checks and drops	170.98	
Extension lateral No. 12, 18-inch pipe line	333.03	
Extension lateral No. 12, 24-inch pipe line	2,520.76	
		68,693.43
Buildings:		
Office building	2,504.87	
Barn	481.64	
Wagon shed	92.25	
Storehouse building	701.90	
Engineer's cottage	2,244.04	
Tank house	719.36	
Garage	113.06	
Equipment shed	105.64	
Diversion works storehouse	135.94	
		7,098.70
General expense (undistributed)		4,218.59
Headquarters grounds, cultivation and maintenance		6,948.80
Operation and maintenance during construction (distribution system)		43,389.99
Total building cost		600,207.46

Estimated cost of contemplated works, Orland project.

Storage works:	
Surveys for additional storage and right-of-way investigations	$15,000.00
Diversion works, north side diversion	5,000.00

Canal system:	
Structures	$500.00
Fencing	1,500.00
Lateral systems:	
Lining	9,000.00
Structures	3,500.00
Operation and maintenance	14,000.00
	48,500.00

COLORADO, GRAND VALLEY PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Mesa.

Townships: 1 N., Rs. 1 E. and 1 to 3 W.; 2 N., Rs. 2 and 3 W.; 1 S., Rs. 1 E. and 1 W., Ute meridian. 9 S., Rs. 101 to 104 W.; 10 S., Rs. 98, 101, and 103 W.; 11 S., Rs. 98 and 99 W., sixth principal meridian.

Railroads: Denver & Rio Grande; Colorado Midland.

Railroad stations and estimated population, January 1, 1913: Palisade, 940; Clifton, 120; Grand Junction, 8,350; Fruita, 915; Loma, 100; Mack, 50.

WATER SUPPLY.

Source of water supply: Grand River.

Area of drainage basin: 8,550 square miles above Palisade.

Annual run-off in acre-feet of Grand River, at Palisade, 1897 to 1899 and 1902 to 1912: Maximum, 5,230,000 (1912); minimum, 2,300,000; mean, 3,772,000.

Discharge in second-feet of Grand River, at Palisade, 1902 to 1912: Maximum, 43,400; minimum, 944.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Length of irrigation season: From April 1 to October 31, 214 days.

Average elevation of irrigable area; 4,700 feet above sea level.

Average annual rainfall on irrigable area: For 20 years, 8.28 inches; for calendar year 1912, 9.04 inches.

Range of temperature on irrigable area: —15° to 100° F.

Character of soil of irrigable area: Sandy loam, sandy mesas, and adobe.

Principal products: Fruit, sugar beets, alfalfa.

Principal markets: Large cities east of Rocky Mountains for fruit; other products, local.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in September, 1902.

Construction recommended by board of engineers December 15, 1908.

Purchase of rights of way authorized by Secretary November 4, 1911.

Construction authorized by Secretary September 23, 1912.

Entire project 10 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Grand Valley project provides for the diversion of water from the Grand River by a dam to be located about 8 miles northeast of Palisade, Colo., into a canal system on the north side of the river, for the irrigation of lands lying north and west of Grand Junction, Fruita, and Mack, Colo. About 42,750 acres will be supplied by gravity and 10,250 acres by electrically operated pumping plants to be located on the gravity canal. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

CONSTRUCTION DURING FISCAL YEAR.

Temporary Power Plant.—Equipment for the power plant to be used in driving and lining tunnels Nos. 1 and 2, consisting of an air compressor of 600 cubic feet capacity; 200-horsepower steam engine; 150-kilowatt, 250-volt, direct-current generator; and three 80-horsepower boilers, was received by transfer from the Uncompahgre project late in December, 1912. This machinery was overhauled and installed in a power plant at the mouth of Jerry Creek. The plant was put in operation early in February and has given uninterrupted service in furnishing power for operating air drills, electric locomotives, motors on the stiff-leg derrick and pumping plant, and furnishing light about the works.

Tunnel No. 1.—The excavation of the portal cut in the south end of this tunnel was begun on October 22, 1912, and continued until sufficient material had been removed to permit excavating the tunnel. On November 14 work was started on the tunnel excavation, and has since continued without interruption. The excavation of the portal cut at the upper portal was begun on December 2, and of the tunnel section on January 5. The material encountered in the first 175 feet of the upper heading consisted of sand and bowlders, and for the first 70 feet in the lower heading of adobe and bowlders. The balance of the material has consisted of shale, with occasional strata of sandstone and earth. No water has been encountered. The waterway of the finished tunnel will be horseshoe shape, with a height of 14 feet and a maximum width of 17 feet 6 inches, and a capacity of 1,425 second-feet, with a depth of 12 feet of water. On June 30, 1913, the progress attained in the north and south headings of this tunnel, respectively, was 943 and 1,202 linear feet of full section tunnel excavated and lined with timber, and 46 feet and 47 feet of heading excavated in advance of the timbering.

Tunnel No. 2.—Work on the excavation of the cut at the upper portal of this tunnel was begun on March 4, 1913, and on the excavation of the tunnel section on March 18. The material encountered was standstone. The delivery of pipe ordered for the compressed-air line from the power house to this tunnel was delayed by the floods in Ohio, so that the power drills were not put in operation until May 24. On June 30, 1913, there had been excavated in this tunnel 325 linear feet of full section, of which 50 feet were lined with timber, and 25 feet of heading in advance of the full section. The waterway through this tunnel will be rectangular, 16 feet wide, with a capacity of 1,425 second-feet with the water 12 feet in depth.

Earthwork and structures, main canal.—Proposals for the earthwork on the canyon division of the main canal were opened on June 2, and contract awarded to the Reynolds-Ely Construction Co., of Springville, Utah. The contractor had performed no work under his contract prior to July 1, 1913. Three anticorrosive, corrugated-iron, pipe culverts were installed by Government forces as follows: Station 87+60, 24 inches in diameter, 178 feet long; station 181+00, 24 inches in diameter, 162 feet long; station 196+65.4, 36 inches in diameter, 180 feet long.

Telephone line.—Three and six-tenths miles of the project permanent telephone line were built and put in use in connection with the construction work now under way.

RIGHT OF WAY CONTRACTS.

Work was continued in securing contracts for necessary canal right of way through the canyon of the Grand River and through the Mesa County irrigation district, and in effecting settlement on earlier contracts. Negotiations were resumed in July, 1912, with the Rio Grande Junction Railway Co. and its lessees toward securing a contract granting to the project the right to build and maintain a portion of the headworks, main canal, and appurtenances upon, along, and across the right of way of this company. Negotiations were carried on continuously, and late in June an agreement was reached as to the terms of the contract. On June 30 the contract papers were in the hands of the railroad officials for execution. Leases have been made for 50 of the canal right-of-way tracts in the Mesa County irrigation district which will not be needed immediately for construction purposes. On February 13, 1913, the contract was executed between the department and the Grand Valley Water Users' Association, providing for the construction of the project by the United States and the repayment of the costs of construction, maintenance, and operation by the water users.

FINANCIAL STATEMENTS.

Assets and liabilities, Grand Valley project, June 30, 1913

ASSETS.

Cash in special fiscal agent's possession awaiting remittance			$26.05
Inventories:			
Mercantile stores		$92.04	
Equipment in use—			
Animals	$400.00		
Mechanical and other	19,997.81		
		20,397.81	
Materials, supplies, etc., in storehouse		8,851.60	
Cement		2,139.16	
Lumber		5,000.34	
Explosives		824.07	
Forage		244.43	
			37,549.45
Improvements to land:			
Gross cost		455,070.87	
Less credits from incidental operations—			
Rentals, cottages	$2.50		
Rentals, grazing lands	601.50		
Revenues, miscellaneous	2.00		
Profits on mess operations	1,172.48		
Profits on mercantile stores	218.25		
Profits, hospital	64.70		
		2,061.43	
			453,009.44
Total assets			490,584.94

LIABILITIES.

Accounts payable:		
Labor	$12,834.69	
Purchases	5,034.76	
Freight and express	5,838.51	
Passenger fares	30.68	
Land agreements	11,775.00	
		35,513.64
Reserves, for depreciation on plant and equipment		3,000.66
Unadjusted credits, net earnings of Government animals		139.53

Net investment:			
Disbursement vouchers	$427,348.06		
Transfers received	28,892.26		
		$456,240.32	
Less—			
Collection vouchers	991.94		
Transfers issued	3,317.27		
		4,309.21	
			$451,931.11
Total liabilities			490,584.94

Feature costs, Grand Valley project, to June 30, 1913.

Examination of project as a whole:		
Triangulation	$544.23	
Topography, general	7,348.27	
Surveys, Grand Valley Canal area	479.35	
Hydrography	3,211.89	
Surveys, designs, and estimates for alternate canal locations	6,311.89	
		$17,895.63
Administration of project as a whole, general expense		50,420.18
Irrigable lands, farm-unit subdivision		1,688.71
Rights of way:		
Surveys	3,463.54	
Purchases	226,731.66	
		230,195.20
Diversion dam and headwork, diamond drilling and design		3,701.05
Main canal (Canyon), division No. 1:		
Survey and design	10,146.89	
Tunnel No. 1 and portal cuts	102,336.10	
Tunnel No. 2 and portal cuts	16,980.41	
Earthwork	857.30	
Structures	3,324.29	
		133,644.99
Main canal (Mesa County district), division No. 2, surveys		2,687.73
Main canal (to Little Salt Wash), division No. 3, surveys		5,550.04
Telephone system		1,114.14
Buildings and miscellaneous structures		7,336.90
Inventory of cost ledger supplies		836.30
Total building cost		455,070.87

Estimated cost of contemplated works, Grand Valley project.

Rights of way:		
Canyon division	$15,000.00	
Mesa County district division	197,430.00	
Legal, administrative, and incidental expenses	15,570.00	
Contingencies	22,000.00	
		$250,000.00
Diversion dam and headworks (surveys, design, and diamond drilling)		5,000.00
Main canal, Canyon division:		
Preliminary surveys		10,200.00
Tunnel No. 1, portal cuts, and Jerry Creek siphon		342,000.00
Tunnel No. 2 and portal cuts		142,300.00
Earthwork and structures		215,000.00
Main canal, division No. 2 (through Mesa County district, surveys)		2,700.00
Main canal, division No. 3 (to Little Salt Wash, surveys)		5,500.00
Telephone line construction		1,300.00
Buildings and miscellaneous structures		12,000.00
Total		986,000.00

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION AND CLIMATIC CONDITIONS.

Counties: Montrose and Delta.

Townships: 15 S., Rs. 94 to 96 W., sixth principal meridian; 48 to 51 N., Rs. 7 to 12 W., New Mexico meridian.

Railroad: Denver & Rio Grande.

Railroad stations and estimated population January 1, 1913: Montrose, 3,400; Olathe, 600; and Delta, 2,400.

WATER SUPPLY.

Sources of water supply: Gunnison and Uncompahgre Rivers.

Area of drainage basins: Gunnison River, 3,850 square miles; Uncompahgre River, 500 square miles.

Run-off in acre-feet: April to November, inclusive, Gunnison River at River Portal (3,850 square miles), 1905 to 1912: Maximum, 1,798,000; minimum, 917,000; mean, 1,474,000. Uncompahgre River at Fort Crawford (500 square miles), 1896–1899, 1903–1905, 1908–1912: Maximum, 207,000; minimum, 124,000; mean, 166,000.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands irrigated from canals operated by the Reclamation Service are furnished water under rental contracts. All unentered public lands within the project were withdrawn from all forms of entry July 27, 1908.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: Estimated at 44,000 acres.

Area irrigated, season of 1912: 32,400 acres.

NOTE.—Of the above area 27,887 acres were irrigated from the canals operated by the service, and 4,513 acres from canals that were operated by their owners who have contracted to turn them over to the Government and that were supplied with Gunnison water.

Length of irrigating season: From April 1 to October 31, 214 days, on all Government canals except the Loutsenhizer, under which the season ends November 15.

Average elevation of irrigable area: 6,000 feet above sea level.

Average annual rainfall on irrigable area for 13 years, 9.15 inches; 1912 at Montrose, 10.91 inches.

Range of temperature on irrigable area, —25° to 98° F.

Character of soil of irrigable area: Red sandy gravel, adobe, and clay loam.

Principal products: Alfalfa, grain, fruits, sugar beets, potatoes, and vegetables.

Principal markets: Denver, Colo.; Chicago, Ill.; and local mining camps.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in June, 1901.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary March 14, 1903.
Construction authorized by Secretary June 7, 1904.
Contract for construction of Gunnison Tunnel approved October 18, 1904.
South Canal completed May, 1908.
Montrose and Delta Canal purchased May 4, 1908.
Loutsenhizer Canal purchased September 25, 1908.
First irrigation by Reclamation Service, season of 1908.
Gunnison Tunnel completed for present use June, 1910.
Gunnison River water for irrigation first turned through tunnel July 6, 1910.
Gunnison River diversion dam completed January, 1912.
Entire project 58 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Uncompahgre Valley project provides for the diversion of water from the canyon of Gunnison River by means of a tunnel about 6 miles long and a canal 11 miles long to supplement the flow of Uncompahgre River, and in addition thereto the utilization of all waste, seepage, spring, percolating, and return water arising within the project in the irrigation of lands in Uncompahgre Valley. To distribute the waters of the Uncompahgre and Gunnison Rivers thus combined the plan provides for the purchase, enlargement, and extension of the more important private canals taking water from Uncompahgre River and for supplementing them by laterals diverting from the South Canal and by high-line canals, one on either side of the valley, taking water from Uncompahgre River.

The construction of a diversion dam in the Gunnison River, the South Canal and South Canal lateral system, and the main line of the West Canal have been completed. The Gunnison Tunnel has been completed to the extent necessary for present use. The Montrose and Delta Canal system and the Loutsenhizer Canal system have been purchased and contracts for the transfer of the Reservation, North Mesa, High Line, Boomer, Colorow, and Selig canals to the Government have been approved by the department. The owners of the Logan, Chipeta, Homerun, Garnet, and Delta Chief canals have made arrangements to transfer their irrigation works to the United States. The Montrose and Delta Canal has been enlarged and extended, and the lower end of the Loutsenhizer Canal has been trebled in capacity. Work is now in progress on the West Canal lateral system and the high-line canal of the Selig system. The construction of other units of the East Canal and Selig systems will be undertaken at an early date. The investigation of the Taylor Park dam site will be continued during the summer of 1913. The completion of the Gunnison Tunnel lining will be postponed until a later date.

CONSTRUCTION DURING FISCAL YEAR.

Gunnison River diversion dam.—One hundred and fifty square yards of grouted paving were placed on the earth slopes above the sluiceway and 175 cubic yards of rock fill dumped into depressions in the river bed above the weir.

Gunnison Tunnel.—All uncompleted sections of floor were concreted, a total of 2,171 linear feet being put in place; 200 linear feet of concrete floor and 103 linear feet of concrete arch and side walls were placed in the River Portal incline; a concrete portal was built at the River Portal end of the Gunnison Tunnel; 485 linear feet of ruptured floor, extending the full width of the tunnel, were torn out and replaced with reenforced concrete; 600 linear feet of washed-out floor, 2 feet in width, were replaced with new concrete; 34 linear feet of timbering were put in place and all cracks and soft spots in the side walls were grouted with cement mortar.

Taylor Park Reservoir.—Two diamond drill holes were driven at the Taylor Park dam site, one hole being carried to a depth of 66.5 feet below the ground surface and the other to a depth of 46.7 feet. Twelve test pits were also dug on the hillside along the dam site. Topographic, placer claim, section line, and traverse surveys were also run out.

South Canal system.—Sixty linear feet of ruptured concrete wall on the left side of the canal were torn out and replaced with a rock wall faced with 6 inches of reenforced concrete; 360 linear feet of reenforced concrete 4 inches thick and 175 linear feet 6 inches thick were placed on top of the old canal floor and 668 linear feet of old canal lining were covered with a 4-inch face of reenforced concrete. An old timber flume over the High Line Canal was replaced with a 17-inch pipe flume 713 feet long. One bridge, 1 wooden flume, 1

pipe culvert, 5 timber drops, 1 chute, and 18 new taps were built on the lateral system. The Mowry lateral, having a capacity of 20 second-feet and a length of 2.22 miles, was constructed under informal contract, 8,780 cubic yards of material being excavated.

East Canal system.—The dredging excavation of divisions 6 and 8 of the old Loutsenhizer Canal was completed during July, 1912. The contract for this work involved the total excavation of 87,067 cubic yards, of which 10,200 cubic yards were excavated during the fiscal year. An informal contract under date of July 27, 1912, was entered into for the excavation of division 9 of the East Canal, involving the removal of 8,347 cubic yards. This work was completed in September, 1912.

West Canal system.—The excavation of 11½ miles of the West Canal, under contract, was completed in September, 1912. This contract involved the total excavation of 181,884 cubic yards and the driving of 1,750 linear feet of tunnel. Under the contract 90,600 cubic yards of excavation and the driving of 120 feet of tunnel were accomplished during the fiscal year. Five informal contracts were entered into during November and December, 1912, for the excavation of 8.6 miles of the Shavano lateral between stations 0 and 453. This work was completed in June, 1913, a total of 34,703 cubic yards having been excavated.

A contract was entered into, under date of January 29, 1913, for the excavation of schedule 2 of the West Canal extension, involving the excavation of 7,600 cubic yards and the driving of 800 linear feet of tunnel. On June 30 the contractors had excavated 7,507 cubic yards and driven 760 linear feet of tunnel.

In addition to the foregoing contract work, the Government forces have excavated 20,500 cubic yards of canals and laterals, straightened Horsefly and Happy Canyon Creek channels, and built a road 0.93 mile in length over the West Canal Tunnel. In the channel and road construction 9,200 cubic yards of material were moved.

A concrete-lined channel, involving the placing of 130 cubic yards of reenforced concrete for railroad and highway crossing, was built and 1,750 cubic yards of concrete were placed in the lining of the West Canal Tunnel and its approaches. A box culvert having an interior cross section of 2 by 5 feet and 100 feet long was built on the Shavano lateral to allow surface drainage to pass over the canal. Eight semicircular steel flumes of the Hess type, varying in size from No. 204 to No. 168, were installed. These flumes have a total length of 1,492 feet and rest upon concrete piers. A concrete core wall 100 feet in length and two concrete culverts 24 and 42 inches in diameter and having a length of 77 and 100 linear feet, respectively, were constructed. Four corrugated-iron pipe culverts, with concrete end walls and collars and having a total length of 277 linear feet, were placed. Two of these culverts are 24 inches and two 36 inches in diameter. On the Shavano lateral six flumes, supported on concrete piers and having a total length of 346 linear feet, were completed. Five of these flumes are of galvanized steel and one of wood. Nine timber culverts, 5 pipe culverts, 15 bridges, 20 pipe flumes, 9 taps, 1 headgate, and 1 drop were also built on this system.

Montrose and Delta system.—The river dike above the Montrose and Delta headworks was raised 3 feet and widened 6 feet for a dis-

tance of 700 feet above the gates, and the remaining 1,000 feet was raised from 6 inches to 3 feet and widened from 2 to 6 feet. At points where slides occurred on mile 3 during the irrigation season of 1912 the canal channel was thrown from 5 to 25 feet into the hill. Four and a half miles of new laterals were excavated, requiring the handling of 24,200 cubic yards of material. A concrete retaining wall 316 feet long was completed on the river side of the Montrose and Delta intake, and a line of sheet piling 565 feet in length was driven to protect the canal from the high waters of the Uncompahgre River. One hundred and twenty-seven cubic yards of reenforced concrete were placed in the sluiceway floor at the headworks. The safe operation of the King lateral extension necessitated the construction of 497 linear feet of bench flume. To prevent seepage at the lower end of the High Mesa siphon, the siphon was extended and 250 linear feet of 36-inch corrugated-steel pipe were installed. One timber flume and 14 bridges, 3 chutes, 7 drops, 1 headgate, and 26 measuring devices were built and 21 drops and 25 taps were replaced.

Loutsenhizer system.—A three-room section house was built at the headworks; the old Cedar Creek flume was replaced with a new timber structure, having a clear width of 16 feet, depth of 5 feet, and length of 96 feet; 2 timber chutes were built to replace shale drops on the main canal, one chute having a length of 96 feet and overcoming a fall of 44 feet, and the other a length of 46 feet and overcoming a 24-foot fall; a timber flume was replaced with a 128-foot steel flume; and 6 taps, 1 water-register box, 3 bridges, 1 bulkhead, 3 small chutes, 3 lateral headgates, 2 timber flumes, and 6 drops were replaced. Unless otherwise stated, all of the construction work for the fiscal year was performed by Government forces.

OPERATION AND MAINTENANCE.

During the season of 1912, the Reclamation Service supplied and distributed water for the irrigation of 27,887 acres of land, 17,408 acres of which were supplied from the Montrose and Delta Canal; 6,340 acres from the Loutsenhizer Canal; 601 acres from the South Canal; 390 acres from the Boomer Canal; 760 acres from the Reservation, and 2,388 acres from the High Line Canal. The following private canals, Logan, Homerun, Chipeta, North Mesa, Colorow, and Garnet, were supplied with Gunnison water, and 4,513 acres were irrigated under these canals. During the season, 140,601 acre-feet of water were diverted into the canals operated by the service, 133,912 acre-feet of this amount being delivered to the land. All water was furnished on a rental basis, the charge being $80 per second-foot per season for all consumers along the Montrose and Delta and South Canals; those consumers possessing water rights in the Loutsenhizer Canal were assessed $20 per second-foot for Uncompahgre water and $60 additional per second-foot for Gunnison water. Private canals were furnished with Gunnison water at the South Canal outlet at the rate of $60 per second-foot.

The operation of the Gunnison Tunnel and South Canal was continued until October 12, 1912, except for two shutdowns covering a total period of 3 days in order to make minor repairs. The Montrose and Delta Canal was shut off for a period of 10 days in July to repair

and strengthen sliding banks at milepost 5; considerable bank settlement occurred at this location during the spring of 1913, and a temporary camp was maintained there for 1½ months to excavate drain trenches and maintain the banks. Gunnison water was turned into the Uncompahgre Valley on May 8, 1913. During the 1913 season the operation of all canals, except the South Canal and the King lateral extension, was practically continuous; the South Canal was shut off for 5 days at two different periods in order to make some concrete repairs, and the King lateral extension was shut off at two different periods of 1 week each in order to repair a break in one case and to prevent one in the other. During the irrigating season the operating force was employed in regulating the distribution of water and making minor repairs, and during the remainder of the year the force was engaged in cleaning the canal of vegetable growths and deposits of sand and in repairing and installing structures.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Uncompahgre Valley project.

Item.	1909	1910	1911	1912	1913
Acreage for which service was prepared to supply water	20,600	24,000	30,000	32,000	[1] 44,000
Acreage irrigated:					
Under rental contracts	16,500	17,080	20,995	27,887	[1] 30,000
Under private canals	22,500	19,994	19,461	15,623	[1] 13,400
Gunnison water, private canals	.....	1,963	4,362	4,513	[1] 6,500
Number of farms irrigated	.....	.....	1,131	1,245	[1] 1,300
Miles of canal operated	117.5	129.2	131	210.7	[1] 228.1
Water diverted (acre-feet)	.....	.....	.....	140,601	.....
Water delivered to land (acre-feet)	73,988	106,765	113,789	133,912	[1] 144,000
Water delivered per acre of land irrigated (acre-feet)	4.5	6.25	5.44	4.81	[1] 4.80

[1] Estimated.

SETTLEMENT.

No public lands under this project are open to entry at the present time and no public notices have been issued. The only settlement that has taken place in the past few years has been due either to the transfer of private lands or to entries made prior to July 27, 1908. Many owners have subdivided their holdings and have sold small tracts to new settlers.

PRINCIPAL CROPS.

The short growing season of 1912 exerted considerable influence on all crops raised in the Uncompahgre Valley. The yields per acre on practically all crops were reduced as compared with 1911, except on fruits, which were, however, considerably smaller than during the previous year. The prices obtained corresponded closely to those during the 1911 season, except for onions, potatoes, and orchard products. Onions this year averaged about 22 cents per bushel, as against 61 cents for 1911; potatoes, about 32 cents per bushel, as against 98 cents for 1911; and fruit brought about twice as much per pound during 1911.

Crop statistics, Uncompahgre Valley project, calendar year 1913.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	16,869	Ton	51,833	$405,723.33
Alfalfa and other crops	1,520			27,430.10
Barley	115	Bushel	2,606	1,790.97
Beans	152	do	2,686	6,177.50
Beets	2,934	Ton	34,181	174,007.59
Corn	245	Bushel	7,906	4,354.58
Garden	241			15,589.95
Oats	6,454	Bushel	249,978	115,249.45
Onions	455	do	166,107	36,912.80
Pasture	2,448			36,720.00
Potatoes	6,847	Bushel	1,054,787	341,176.92
Wheat	4,142	do	119,295	99,680.68
Orchard:				
Apples	2,031	Pound	20,741,550	187,251.14
Peaches	280	do	1,089,375	10,884.00
Mixed	854			36,059.14
Mixed and other crops	126			4,107.31
Young orchard and other crops	2,220			42,273.20
Miscellaneous crops	90			8,123.96
Total cropped	[1]48,023			1,553,512.62

[1] This includes 15,623 acres of land irrigated under private canals.

FINANCIAL STATEMENTS.

Assets and liabilities Uncompahgre Valley project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to special fiscal agents			$24.55
Inventories:			
Mercantile stores		$126.25	
Equipment in use—			
Animals	$6,225.00		
Mechanical and other	30,929.10		
		37,154.10	
Materials, supplies, etc., in storehouse		26,042.33	
Cement		15,027.59	
Lumber		14,074.71	
Explosives		1,609.01	
Forage		519.35	
Fuel		196.05	
Goods in transit		390.98	
Unadjusted deposit		250.00	
			95,390.37
Improvements to land:			
Gross cost		5,227,301.24	
Less credits from incidental operations—			
Rentals of cottages	$17,801.98		
Rentals of irrigation water	180,045.57		
Revenues, miscellaneous	400.00		
Profits on mess operations	8,910.95		
Profits, mercantile stores	20,510.64		
Loss, hospital	[1]348.74		
Contractor's freight refunds	2,475.89		
		229,796.29	4,997,504.95
Total assets			5,092,919.87

[1] Deduction.

LIABILITIES.

Accounts payable:			
Labor		$8,461.16	
Purchases		6,081.77	
Contract estimates		10,603.69	
Contract holdbacks		2,364.74	
Freight and express		3,094.82	
Passenger fares		170.75	
Coupons		28.75	
Meal tickets		150.25	
			$30,955.93
Reserves for depreciation on plant and equipment			1,134.48
Unadjusted credits, net earnings of Government animals			9,842.08
Net investment:			
Disbursement vouchers	$5,246,064.34		
Transfers received	120,129.87		
		$5,366,194.21	
Less:			
Collection vouchers	202,184.30		
Transfers issued	23,022.53		
		315,206.83	
			5,050,987.38
Total liabilities			5,092,919.87

Feature costs, Uncompahgre Valley project, to June 30, 1913

Storage, preliminary examination, Taylor Park Dam			$6,585.72
Cimarron lateral topography			1,319.11
Gunnison Tunnel:			
Headworks, headgates, excavation, and concrete		$21,058.65	
Gunnison River weir		113,551.86	
River portal heading		1,028,496.69	
West portal heading		1,625,667.93	
Portal cut excavating and lining		118,292.78	
Tunnel road		37,552.93	
Engineering		42,954.41	
Paid contractor		18,890.05	
			3,006,465.30
Canal system:			
Purchase of existing canal systems (outstanding water rights and real estate)		149,155.21	
General expense (undistributed)		19,469.17	
South Canal—			
Main line		759,252.35	
Cedar Valley		30,384.34	
Lateral systems		33,356.38	
High Line Canal		3,771.73	
Montrose and Delta Canal—			
Main line		145,177.48	
King lateral		8,689.30	
King lateral extension		127,881.77	
East Coal Creek lateral		7,404.73	
Franklin Mesa lateral		6,807.04	
High Mesa lateral		44,261.67	
Spring lateral		8,931.95	
California Mesa lateral		571.12	
Lateral systems		6,575.07	
Loutsenhizer Canal—			
Main line		17,093.27	
Lateral systems		2,152.28	

Canal system—Continued.		
West Canal—		
Main line	$180,786.08	
Lateral systems	1,937.12	
Shavano lateral	18,984.25	
West Canal extension	20,933.53	
East Canal	48,965.54	
Selig Canal	3,889.05	
Selig Canal extension	16,118.42	
Garnet Canal	278.50	
Ironstone Canal	2,115.35	
North Mesa Canal	753.16	
		$1,665,695.86
Operation and maintenance during construction:		
Gunnison Tunnel	25,199.03	
South Canal—		
Main line	74,780.55	
Cedar Valley	1,626.90	
Lateral systems	1,700.34	
Highline	7,259.24	
Montrose and Delta Canal—		
Main line	71,723.63	
King lateral	6,691.44	
King lateral extension	6,521.80	
East Coal Creek lateral	2,099.99	
Franklin Mesa lateral	935.30	
High Mesa lateral	1,357.91	
Spring lateral	754.47	
California Mesa lateral	7,694.49	
Spring Creek Mesa lateral	3,667.69	
Lateral systems	658.61	
Loutsenhizer Canal—		
Main line	26,875.46	
Lateral systems	2,342.08	
West Canal—		
Main line	504.07	
Lateral systems	2,254.60	
Shavano lateral	29.06	
West Canal extension	30.52	
North Mesa Canal	523.55	
		245,230.73
Buildings:		
Montrose office	10,575.54	
Warehouse	4,177.65	
Vault	764.08	
Cement shed, Uncompahgre	259.04	
Montrose garage	347.37	
		16,123.68
Telephone systems, construction		6,507.28
Preliminary topography, surveys		62,126.50
Irrigable lands, farm unit subdivision, and soil examination		3,224.23
Examination of project as a whole—expert engineering, hydrography, geology, lateral investigation, reconnoissance, etc		28,675.62
Administration of project as a whole:		
General expense (undistributed)	$145,126.44	
Montrose office (undistributed)	39,958.27	
		185,084.71
Power developement, surveys		262.50
Total building and operation and maintenance cost (during construction)		5,227,301.24

Estimated cost of contemplated works, Uncompahgre Valley project.

General administration	$9,000
Cimarron lateral	4,000
Topographic surveys	63,000
Montrose office buildings	2,000

Irrigable lands	$5,000
Preliminary operation and maintenance	90,000
Taylor Park reservoir	7,000
Gunnison Tunnel	100,000
Gunnison River weir	300
Purchase of existing rights, canals, and rights of way	80,000
South Canal system	1,000
Montrose and Delta system	56,000
Loutsenhizer system	21,000
East Canal system	185,000
Selig Canal system	135,000
California system	150,000
Garnet system	10,000
Telephone system	3,500
Drainage work	20,000
Total	941,800

IDAHO, BOISE PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Ada, Boise, Canyon, and Elmore.

Townships: 1 S. to 5 N., Rs. 6 W. to 6 E., Boise Meridian, and Ts. 21 and 22 S., R. 46 E., Willamette Meridian.

Railroads: Oregon Short Line; Boise, Nampa & Owyhee; Idaho Northern; Idaho Traction; Arrowrock.

Railroad stations and estimated population January 1, 1913: Boise, 20,000; Nampa, 4,500; Caldwell, 4,000; Meridian, 650; and Kuna, 200.

WATER SUPPLY.

Source of water supply: Boise River.

Area of drainage basin: 2,610 square miles.

Annual run-off in acre-feet of Boise River near Highland (2,610 square miles), 1895 to 1912, maximum, 3,100,000; minimum, 1,200,000; mean, 2,500,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 207,000 acres, including 18,000 acres of lands in territory of New York Canal Co.

Area under rental contracts and other arrangements, season of 1913: 82,250 acres.

Length of irrigation season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 2,500 feet above sea level.

Average annual rainfall on irrigable area: At Boise station for 35 years, 13.41 inches (1912, 18.10 inches).

Range of temperature on irrigable area: —28° to 107° F.

Character of soil of irrigable area: Clayey loam; light sandy loam; and sandy loam.

Principal products: Alfalfa, wheat, oats, potatoes, apples, prunes, and small fruits.

Principal markets: Boise, Nampa, Caldwell, and Meridian, Idaho; Portland, Oreg.; and eastern cities.

LANDS OPENED FOR IRRIGATION.

The project has not been formally opened.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.
Construction recommended by board of engineers February 15, 1905.
Construction authorized by Secretary March 27, 1905.
Main canals of New York Canal Co. and Idaho-Iowa Lateral & Reservoir Co. acquired March 3, 1906.
First irrigation by Reclamation Service, season of 1906.
Boise River Dam completed September, 1908.
Arrowrock Dam construction recommended by board of engineers, December 13, 1910.
Arrowrock Dam construction authorized January 6, 1911.
Upper Deer Flat embankment completed March, 1911.
Deer Flat Forest embankment completed June, 1911.
Arrowrock Railroad operated on regular schedule November, 1911.
Lower Deer Flat embankment completed January, 1912.
Diversion tunnel at Arrowrock Dam site completed January, 1912.
Enlargement of Main Canal completed February, 1912.
Boise River power plant completed May, 1912.
Lining Main Canal completed February, 1913.
Pioneer district drainage contract approved by Secretary February 27, 1913.
Pioneer district drainage contract became effective April 23, 1913.
Project, exclusive Boise River storage and inclusive Pioneer drainage, 94 per cent completed June 30, 1913.
Project, inclusive of Boise River storage, 56 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Boise project provides for storage of water in the Arrowrock Reservoir on Boise River about 20 miles above Boise, and in the Deer Flat Reservoir near Caldwell and Nampa, Idaho; the diversion of water from Boise River by the Boise River Dam, about 8 miles above Boise; the distribution of water on the south side of Boise River through the Main Canal leading from the dam to the Deer Flat Reservoir, distributing laterals heading in the Main Canal, distributing canals heading in the Deer Flat Reservoir, and distributing canal systems heading in the Boise River below the Boise River Dam; and the distribution of water on the north side of the Boise River to a small area of land east of Boise through a canal system heading at the Boise River Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith. The Boise River Dam, the Deer Flat Reservoir, and the entire canal system, except two small pipe lines and a few minor structures, are completed. Construction work on the Arrowrock Reservoir is in progress.

CONSTRUCTION DURING FISCAL YEAR.

Storage unit.—The Boise power plant has furnished all power necessary for the construction work at Arrowrock and about half of the output has been sold. The concrete mixing plant for the work on the first section of the dam was completed early in the year and a distributing plant set up. Cableway No. 1 has been moved to a location covering the downstream edge of the excavation, and the mixing and distributing plants have been rearranged for work on the second section of the dam. Excavation by steam shovel at the spillway site was commenced in October, since which time about 160,000 cubic yards of material have been excavated. Excavation in the river bed for the foundation of the dam has been completed. The first section of the dam, consisting of about 70,000 cubic yards of concrete, has been finished, and preparations are being made to start work on the second section. When weather conditions were sufficiently favorable for economical operation the sawmill at Cottonwood Creek was op-

erated, and turned out practically all the lumber needed for construction purposes. The Arrowrock Railroad has been operated successfully during the entire year.

Main Canal.—During the year a 350-foot section of the Main Canal above Indian Creek was lined with concrete 4 inches thick, making a total of 6.6 miles of Main Canal that have been concrete lined to date. A concrete turnout from the Main Canal at station 436 was also installed. No new construction work has been performed in the 9 miles of Indian Creek occupied by the Main Canal, or in that portion of the Main Canal between Indian Creek and the Deer Flat Reservoir.

Deer Flat Reservoir.—There has been no new work undertaken in connection with the Deer Flat Reservoir during the year, except the construction of a concrete tower in the upper embankment at the head of the Deer Flat Caldwell Canal, in order to furnish better control of the delivery of water from the reservoir to that canal. This work was completed in February, 1913.

Distribution system.—During the year extensions to the distribution system have been completed by means of pipe lines aggregating 8,336 feet in length and covering approximately 5,000 acres of land. Eight concrete checks have been installed in the Deer Flat Lowline Canal and approximately 2,000 feet of the canal have been lined with concrete 3 inches thick. The wooden chutes at the head of the Golden Gate Canal and Fargo Drop have been replaced with concrete structures of larger dimensions. All of the above work has been performed by Government forces. In addition, the Ross lateral has been enlarged, and the Macy, Nick, Shepherd, and several smaller laterals have been constructed under small contracts with the water users.

Wasteways.—A considerable amount of money has been expended during the year on work by Government forces in connection with wasteways for which adequate provisions had not previously been made, and for which the need has been greatly felt. A reinforced concrete pipe chute 48 inches in diameter has been installed at Fargo Drop for wasteway and irrigation purposes, and a 36-inch reinforced concrete pipe chute has been constructed at the Frohman wasteway. Changes have also been made at Golden Gate Drop to permit of wasting water into Pipe Gulch. That portion of the Richards Point wasteway between the Mora and the Deer Flat Highline canals has been concrete lined. These wasteways give better control, but several conveniently located over the project are still needed, especially when breaks occur along the main canals.

Drainage Work.—The construction of the drainage ditch from the upper embankment was completed in March, 1913. This drain is approximately 4 miles long and was constructed to carry away surface drainage from the Deer Flat Reservoir and to drain lands in the immediate vicinity.

On October 29, 1912, the voters of the Pioneer irrigation district voted to enter into a contract with the United States involving the expenditure of $350,000 in the drainage of lands within the district, and $560,000 for storage capacity in Arrowrock Reservoir. This contract has been approved by the Secretary of the Interior and the purchase of the electric drag-line excavators has been authorized.

Final and right-of-way surveys are in progress. A contract covering an exchange of power has been entered into between the United States and the Idaho-Oregon Light and Power Co., and materials for transmission lines and transformer stations are under consideration.

OPERATION AND MAINTENANCE.

During the season of 1912, 61,725 acres were actually irrigated, including 18,000 acres of New York Canal Co.'s lands. The rental price of water during the season of 1912 was fixed at 40 cents an acre-foot for flood water and 60 cents an acre-foot for stored water. An average of 1.8 acre-feet per acre was used. The right of the United States to take water from the Boise River terminated August 12. A contract was entered into, however, between the United States and the Riverside Irrigation Association by which water for the Riverside Canal was supplied from the Deer Flat Reservoir, and the amount of water covered by the right of that canal in the Boise River diverted from the river into the Government canals and supplied to water users above the Deer Flat Reservoir. By rotating this water in the various flood-water canals considerable good was accomplished and the irrigation season under these canals was materially extended. At the close of the season on October 23, 1912, there were 10,060 acre-feet of available water remaining in the Deer Flat Reservoir.

During the season of 1913 the rental price of water has been fixed again at 40 cents an acre-foot for flood water and 60 cents an acre-foot for stored water. It is estimated that 83,000 acres of land will be under cultivation including 18,000 acres of New York Canal lands. The distribution system is now complete and the service is prepared to furnish flood water to 207,000 acres of land excluding some land the status of which is doubtful. Stored water from the Deer Flat Reservoir can be furnished to 57,000 acres of new lands and also to certain lands in the Nampa-Meridian, Pioneer, and Riverside irrigation districts, which fact can be taken advantage of in an exchange of water. The lands above the Deer Flat Reservoir are dependent on Arrowrock Reservoir and will not be capable of irrigation throughout the entire season until that reservoir is completed.

Idaho-Iowa Lateral & Reservoir Co.'s reservoirs.—The Kuna, Watkins, and Katherine reservoirs have been filled during the year in accordance with the contract entered into between the United States and that company. A small amount of water has been stored in the Hubbard Reservoir and more will be stored there near the end of the flood-water season in order to be available for lands under this reservoir.

Maintenance of canal system.—About 350 feet of the main canal near the head of the Cole lateral have been concrete lined during the year to avoid excessive erosion and seepage. Other portions of the main canal have been gravel lined. Most of the maintenance work performed during the year has been in connection with the lateral system and has consisted of repairing and installing small structures and of cleaning and strengthening canal banks. Two

large wooden chutes have been torn out and replaced with concrete structures. No breaks of any consequence have occurred.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Boise project.

Item.	1909	1910	1911	1912	1913 [1]
Acreage for which service was prepared to supply water	42,000	90,000	120,000	200,000	207,000
Acreage irrigated	21,300	33,377	45,575	61,725	82,250
Number of farms irrigated	640	986	1,223	1,575	1,820
Miles of canals operated	193	340	624	966	980
Water stored (acre-feet) maximum	None.	20,700	67,434	97,888	114,618
Water diverted (acre-feet)	177,124	232,181	337,963	370,056	513,996
Water delivered to land per acre (acre-feet)	1.82	1.55	1.53	1.80	[2]

[1] Estimated. [2] Not yet determined.

SETTLEMENT.

The population of the Boise project is comparatively permanent. The project has not yet been opened by the Secretary of the Interior, and there are, therefore, 92 farm units, or 5,217 acres, under the project that, under the acts of June 25, 1910, and February 18, 1911, are not subject to entry until the project is opened. During the year 3,680 acres of land under the project have been sold by the State and for the most part are now occupied and being farmed. There have also taken place some subdivisions of private land and a few private sales of entire holdings. There have been 16 assignments and 4 relinquishments made of parts of entries during the year. The number of relinquishments and assignments of whole units has been comparatively small, probably not exceeding 25 of each.

Year.	Number of farms.	Number of farms irrigated.	Population.	
			Farms irrigated.	Total.
1909	2,000	640	2,560	4,000
1910	2,250	986	3,944	6,000
1911	2,440	1,223	4,892	7,500
1912	2,700	1,575	6,350	9,000

PRINCIPAL CROPS.

Of the 82,250 acres of land now in cultivation, including the land covered by the New York Canal water, 35 per cent is in hay, 50 per cent in grain, 10 per cent in orchard, and 5 per cent in miscellaneous crops. The crop returns for 1912, although not large, were on the whole quite satisfactory; the crops for 1913 are in excellent condition and very promising. It is anticipated that considerable late seeding of land below the Deer Flat Reservoir will be accomplished.

Crop statistics, Boise project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	10,428	Ton	38,878	$174,951.00
Alfalfa and clover (seed)	1,510	Bushel	7,210	51,912.00
Barley	1,490	do	30,827	18,496.20
Clover	1,353	Ton	2,617	15,702.00
Grain hay	492	do	712	4,272.00
Corn	1,689	Bushel	35,560	23,114.00
Millet	84	do	1,198	4,193.00
Oats	6,642	do	213,173	85,269.20
Orchard (bearing)	32	Acres		5,930.50
Pasture	4,099	do		24,150.00
Potatoes	1,332	Bushel	131,864	66,432.00
Rye	268	do	2,985	1,791.00
Vegetables, miscellaneous	528	Acres		15,658.80
Wheat	6,862	Bushel	133,163	79,897.80
Less duplicated areas	1,228			
Total cropped	35,581			571,769.50
Other purposes	1,217			
Not reported	6,927			
New York Canal Co. land	18,000			
Total irrigated	61,725			

FINANCIAL STATEMENT.

Assets and liabilities, Boise project, June 30, 1913.

ASSETS.

Cash:			
In special financial agent's possession awaiting remittance			$0.35
Accounts receivable:			
Water rentals		$52,663.67	
Miscellaneous		16,854.37	
			69,518.04
Inventories:			
Mercantile stores		19,651.54	
Equipment in use—			
Government animals	$13,147.00		
Mechanical and other	336,261.94		
		349,408.94	
Materials, supplies, etc., in storehouse		46,229.14	
Cement		13,787.89	
Structural iron and steel		6,430.69	
Lumber		5,458.32	
Explosives		5,888.59	
Forage		698.86	
Fuel		6,587.21	
Products of local operations		13,778.44	
Goods in transit		2,635.64	
Unadjusted transfers between projects		376.23	
Undistributed cost (freight and handling on inventory property)		4,985.00	
			475,916.49
Improvements to land:			
Gross cost of improvements		8,132,831.12	
Less credits from incidental operations—			
Rentals of cottages	$9,973.42		
Rentals of power and light	16,597.12		
Rentals of grazing lands	10,189.65		
Rentals of irrigation water	178,442.04		
Revenues, miscellaneous	18,910.86		
Profits on mess operations	35,710.98		
Profits on mercantile stores	24,324.12		
Profits, miscellaneous	71.86		
Loss on hospital operations	[1] 3,641.68		

[1] Deduct.

Improvements to land—Continued.			
By adjustments—			
Contractors' freight refunds	$12,293.14		
Forfeitures of defaulting bidders and contractors	19,167.92		
		$322,039.43	
			$7,810,791.69
Total assets			8,356,226.57

LIABILITIES.

Accounts payable:			
Labor		39,234.43	
Purchases		16,194.87	
Freight and express		28,029.72	
Passenger fares		193.15	
Land agreements		1,583.00	
Coupons		199.15	
Meal tickets		577.77	
Miscellaneous		53.68	
			86,065.77
Reserves, for depreciation on plant and equipment			96,679.08
Unadjusted credits, net earnings of Government animals			18,018.70
Net investment:			
Disbursement vouchers	$8,205,940.44		
Transfers received	272,127.62		
		8,478,068.06	
Less—			
Collection vouchers	254,857.85		
Transfers issued	67,747.19		
		322,605.04	
			8,155,463.02
Total liabilities			8,356,226.57

Feature costs, Boise project, to June 30, 1913.

Boise River storage:		
General expense (undistributed)	$6,133.82	
Preliminary investigations and surveys	68,461.89	
Right of way, Arrowrock Reservoir	61,632.32	
Boise & Arrowrock Railway	393,746.72	
Power plant and transmission line	236,108.97	
Telephone line	9,008.26	
Wagon roads	53,473.83	
Repairs, diversion dam	4,534.96	
Roller dam in logway, diversion dam	7,634.89	
Clearing Arrowrock Reservoir	1,453.41	
General accounts, Arrowrock Dam	54,349.46	
Camp construction	103,964.56	
Camp maintenance	54,944.17	
Preparatory expense and plant installation	142,495.35	
Diversion works	313,011.73	
Spillway	104,314.25	
Outlet works	11,956.88	
Dam proper	699,656.63	
		$2,326,882.10
Distribution system:		
General expense, Boise office		2,794.73
Preliminary examination:		
South side unit	21,649.02	
North side, Payette and Sucker Creek units	17,174.53	
Investigation, water supply	20,434.21	
Administrative expense	3,075.57	
		62,333.33

Diversion dam:		
Location and surveys	$944.70	
Original construction	269,463.75	
Repairing	74,035.94	
Administrative expense	17,737.78	
		$362,182.17
Main Canal:		
Location and surveys	6,515.02	
Right of way	3,544.61	
Construction, canal	1,059,120.75	
Structures	185,859.67	
Lining	307,791.10	
Administrative expense	80,451.57	
		1,643,282.72
Distribution system from main canal:		
Location and surveys	46,797.12	
Right of way	6,616.51	
Canal and lateral construction	581,285.01	
Structures	462,247.76	
Wasteway system	102,303.83	
Administrative expense	62,479.37	
		1,261,729.60
Storage Deer Flat Reservoir:		
Location and surveys	4,639.70	
Right of way	222,971.17	
Upper embankment	332,663.78	
Lower embankment	337,128.74	
Small embankment and miscellaneous	21,414.04	
Administrative expense	47,366.00	
		966,183.43
Distribution system from Deer Flat Reservoir:		
Location and surveys	24,836.27	
Canal and lateral construction	336,059.45	
Structures	415,639.18	
Wasteway system	129,406.88	
Administrative expense	49,395.81	
		955,337.59
Drainage work:		
Below upper embankment	28,275.23	
Preliminary survey	1,823.27	
Pioneer irrigation district contract	3,824.64	
		33,923.14
Office building at Boise:		
Office buildings and grounds	20,705.67	
Administrative expense	1,043.40	
		21.749.07
Penitentiary Canal:		
Right of way	3,268.45	
Canal construction	14,245.87	
Structures	3,226.07	
Administrative expense	1,043.40	
		21.783.79
Irrigable lands:		
Subdivision into farm units	28,906.00	
Publicity work, duty of water investigation, etc	20,499.04	
Farming Government ranches	4,769.57	
Administrative expense	3,045.01	
		57.219.62
Telephone system:		
Location and surveys	701.90	
Construction	31,433.80	
Administrative expense	1,667.09	
		33,802.79

Operation and maintenance (during construction):		
Main Canal system	$178,829.60	
Deer Flat Reservoir system	67,162.87	
Penitentiary Canal	9,355.10	
Storage	216.69	
Carriage, headworks to Indian Creek	6,888.97	
Carriage, Indian Creek to reservoir	38,949.32	
Distribution	930.89	
Drainage	2,362.01	
Administrative expense	17,634.67	
		$322,330.12
Inventory of building cost ledger supplies		61,296.92
Total building and operation and maintenance cost during construction		8,132,831.12

Estimated cost of contemplated works, Boise project.

Distribution unit:			
Lateral system; installation of new structures and extension of laterals		$15,000	
Pioneer irrigation district drainage		120,000	
Additional wasteways, contemplated		100,000	
Operation and maintenance		125,000	
Surveys, farm units, water measurements, etc		15,000	
Purchase of old power rights, Boise River		20,000	
			$395,000
Storage unit:			
Right of way		18,000	
Camp construction		3,000	
Wagon roads		15,000	
Camp maintenance		29,000	
Arrowrock Dam:			
(*a*) Spillway	$150,000		
(*b*) Outlets and gates	200,000		
(*c*) Dam proper	1,150,000		
(*d*) General accounts	70,000		
		1,570,000	
Arrowrock power plant		21,500	
Incidentals and miscellaneous		25,000	
			1,681,500
Total estimate			2,076,500

IDAHO, MINIDOKA PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Lincoln and Cassia, Idaho; Jackson Lake Reservoir, Uinta, Wyo.

Townships: 8 to 11 S., Rs. 22 to 25 E., Boise meridian; Jackson Lake Reservoir, Ts. 44 to 46 N., Rs. 114 to 116 W., sixth principal meridian, Wyoming.

Railroads: Oregon Short Line; Salt Lake & Idaho.

Railroad stations and estimated population January 1, 1913: Acequia; Rupert, 700; Heyburn, 300; Burley, 1,500; and Ashton, 600.

WATER SUPPLY.

Source of water supply: Snake River supplemented by storage.

Area of drainage basin: 22,600 square miles above diversion dam.

Annual run-off in acre-feet of Snake River at Montgomery Ferry and Neely (16,000 square miles), 1896 to 1912: Maximum, 8,900,000; minimum, 3,830,000; mean, 6,635,000. South Fork of Snake River at Moran, Wyo. (980 square miles), 1904 to 1912: Maximum, 1,640,000; minimum, 920,000; mean, 1,318,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 115,600 acres.

Area under water-right applications and rental contracts, season of 1913: 99,700 acres.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 4,225 feet above sea level.

Average annual rainfall on irrigable area: 12.75 inches, average of 7¾ years; 15.39 inches in 1912.

Range of temperature on irrigable area: —11° to 100° F.

Character of soil of irrigable area: On north side of river sand and sandy loam predominate; about one-third of the area is clay loam. On the south side of the river the soil is a disintegrated lava ash.

Principal products: Alfalfa, grasses, rye, wheat, oats, sugar beets, potatoes, small fruits.

Principal markets: Pocatello, Idaho; Salt Lake, Utah; Butte and Helena, Mont.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto (gravity unit): Public notices—March 9, 1907; November 23, 1908; February 11, 1909; March 30, 1909; February 7, 1910; March 22, 1910; June 10, 1910; October 13, 1910; November 3 and November 25, 1910; January 23, 1911; December 30, 1911; March 21, 1912. Orders—July 19, 1907; December 10, 1907; July 9, 1908; December 27, 1910; March 18, 1911; March 31, 1911; May 4, 1911; June 8, 1911; February 26, 1913; March 19, 1913; March 25, 1913. (South side pumping unit): Orders—March 24, 1911; March 19, 1912; May 13, 1912; October 10, 1912; March 25, 1913.

Location of lands opened: Ts. 8 to 10 S., Rs. 22 to 25 E., Boise meridian.

Present status of irrigable lands opened: 63,288 acres entered subject to the reclamation act; 924 acres open to entry; 8,100 acres of State land; 360 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 3 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $22, $30, and $40.

Annual operation and maintenance charge: $1.50 and $1.75 per acre of irrigable land. About 32,000 acres in the south side pumping unit are being irrigated in 1913 on a rental basis.

CHRONOLOGICAL SUMMARY.

First surveys with reference to storage possibilities in 1902.

Reconnoissance and preliminary surveys for main project begun March, 1903.

Construction recommended by board of engineers. March 21, 1904.

Construction authorized by Secretary April 23, 1904.

Minidoka Dam completed September, 1906.

Temporary dam on the Moran site, Jackson Lake, completed in 1907.

North canal and distributing system completed July, 1907.

First irrigation by Reclamation Service, season of 1907.

Power house completed for present use December 1, 1909.

Surveys and borings for permanent dam at Jackson Lake made in 1909 and 1910.

Wagon road (36 miles to site of dam at Jackson Lake) completed August 5, 1910.

Installation of machinery for 10,000 horsepower completed August, 1911.

Jackson Lake Dam completed November 25, 1911.

Contract for enlargement of Jackson Lake reservoir entered into February 25, 1913.

Gravity unit 89.5 per cent completed June 30, 1913.

South side pumping unit 92.5 per cent completed June 30, 1913.

Entire project 91 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Minidoka project provides for the diversion of the waters of Snake River by a combined storage, diversion, and power dam about 6 miles south of Minidoka, Idaho, into two canal systems, one on either

side of the river, watering lands in the vicinity of Acequia, Rupert, Heyburn, and Burley, Idaho. Power developed at the dam is utilized primarily for pumping water from the canals to irrigate high lands, but also for pumping for drainage purposes, and for furnishing heat, light, and current for commercial use to the towns on the project and the farms adjacent to them. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith. Storage for the project is provided mainly by a reservoir constructed in the upper drainage basin of Snake River, at Jackson Lake, Wyo. This is supplemented by the reservoir formed by the Minidoka Dam, and known as Lake Walcott. Jackson Lake Dam, as originally planned, and Minidoka Dam are completed. It is now proposed to raise Jackson Lake Dam 17 feet. The irrigation system for the gravity unit and the south side pumping unit, and the drainage system for the gravity canals are under construction.

CONSTRUCTION DURING FISCAL YEAR.

North side drainage system.—Several new pumping stations were installed during the year either for temporary or permanent disposal of drainage waters; in most of these the discharge is emptied into adjacent irrigation canals and mingled with the water in these canals. Open channels lead the water to the pumps. Excavation by means of the two steam dredges was continued and a small floating suction dredge was built and operated near Boerschs Lake. Work was confined chiefly to the large deep drains, part of the work on which was done by contract. Two electric drag-line machines were ordered for the drainage work.

Buildings.—A two-story reenforced concrete office, store, and shop building was erected at the diversion dam, north of the power station, and a frame warehouse at Rupert for the better storage and handling of supplies and materials. At Burley a new stable and corral were built.

Minidoka Dam.—During a heavy windstorm in September, 1912, the earth and rock fill portions of the diversion dam were damaged by heavy wave action. This was repaired, the rock paving on the upper face being relaid and thoroughly grouted, and a concrete parapet wall built at the crest of the slope along the main body of the dam. Preparations were made in the fall for the installation of radial sluice gates in the spillway, but owing to continued high discharge in the river the work was postponed.

North Side Canal system.—A large number of laterals in the gravity unit were rebuilt and placed in first-class condition for operation by the United States, so that water deliveries may be made to each farm unit. Weirs and orifices were placed at the heads of many of the laterals, and this work is being continued. The pumping station and distribution system for the West End pumping extension was built and water delivered to the farms. A permanent system of bench levels was established.

South Side Canal system.—The second lift canal was enlarged in part, and a small amount of work was done on the construction of additional laterals in the distribution system. Measuring devices were installed at the farm unit delivery boxes.

Commercial power.—The sale of power for commercial use continued to increase steadily, and plans were made for the construction of a duplicate transmission line from the second lift pumping station to Burley in order to furnish further security against interruption in service. A substation is also planned for Burley which will make the service independent of the Heyburn station.

Jackson Lake Dam.—The Jackson Lake enlargement unit is being constructed for the purpose of providing the Kuhn Irrigation & Canal Co. and the Twin Falls Canal Co. with about 409,000 acre-feet of stored water in the proportion of 61/80 to the former and 19/80 to the latter. This is to be accomplished by raising the Jackson Lake Dam 17 feet. The dam when complete will consist of a massive concrete gate section, flanked on each side by earth dikes and reenforced concrete abutments. The concrete gate section will be 218 feet long between abutments, with a height above gate sills of 49 feet, a total height of about 69 feet, and a top width of 24 feet to accommodate a 10-foot roadway and the lifting devices. The width at the gate sills will be 61 feet. Twenty 6½ by 8 foot tunnels will extend through the dam, controlled by heavy cast-iron gates. A spillway will be provided, consisting of nineteen 8-foot bays, having a clearance of 6½ feet over the crest of radial gates about 6½ feet high. These gates when raised will allow a clearance of about 12 feet over the spillway crest. A logway 8 feet wide closed by a radial gate 6½ feet high, together with a fish way, will form the south end of this section. Both dikes will have a top width of 20 feet, an upstream riprapped 3 to 1 slope and a downstream 2 to 1 slope. The south dike will be about 150 feet long, with a concrete core wall to bedrock throughout its length. Its maximum and minimum heights will be about 37 feet and zero, respectively. The north dike will be about 4,200 feet long, with a concrete core wall extending into it about 385 feet. This core wall will be founded on bedrock for about 85 feet and on sheet piles for the balance of its length. The maximum and minimum heights of the dike will be 69 feet and 5 feet, respectively. Seepage beneath this dike will be prevented by one or two rows of sheet piles. The estimated cost of the completed dam is $800,000.

On February 25, 1913, a contract was entered into by the United States and the Kuhn Irrigation & Canal Co. whereby the United States agreed to do the construction work in connection with the enlargement of the reservoir at the expense of the Kuhn Irrigation & Canal Co. This contract also contained certain provisions whereby the company could have the use of the camp, telephone lines, wagon road, and warehouse. By signing this contract on March 25 and by subsequently executing a bond, the Twin Falls Canal Co. became a third party to the contract. On May 7 a party consisting of the engineer, the superintendent of construction, the chief clerk, and assistant engineer arrived in camp to start work on the new dam. Wash boring, test pit, road construction, and engineering crews were organized and put to work. At the end of June 16 wash-boring holes had been sunk to a depth of 65 feet, or to bedrock, and about 50 test pits had been dug on the south side hill, the sawmill foundation was well under way, and considerable work had been done on the wagon road and telephone line. Advertisements had been issued for the mercantile store stock, groceries, construction supplies, and nearly all of the equipment needed for the job.

OPERATION AND MAINTENANCE.

The early part of the season of 1913 was cool but very dry and windy, necessitating the use of larger amounts of water in May than customary. Heavy rains in the latter part of that month and for

several days in June reduced the demand for water. The pumps on the South Side unit were started with three shifts on May 5, previous to which water had been furnished for domestic purposes only. Water was furnished in May for the first time from the new pumping station at the west end of the gravity unit; this plant will serve about 2,200 acres, but only a small area will be watered from it during this season.

It is estimated that 42,000 acres are being irrigated under the gravity unit in 1913 and 32,000 acres under the South Side pumping unit. Although the season was retarded by weather conditions, the prospect for good crops is promising. Heavy rains injured the first crop of hay, however, much of which had been cut but not stacked. Indications point to a smaller run-off in the Snake River than that of 1912, but no extreme conditions are anticipated. Abundant storage has been effected in Jackson Lake reservoir for supplying the needs of the project. Rotation delivery is being practiced under the pumping unit, and as the service has taken over the operation of the majority of the laterals under the gravity unit, and is delivering water to the farm units, the rotation idea is being fostered to some extent among the water users and practiced in a limited way.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Below is a historical review of water storage and deliveries, etc., for the project:

Historical review, Minidoka project.

Item.	1909	1910	1911	1912	1913
Acreage for which service was prepared to supply water	81,400	101,000	112,000	112,000	115,600
Acreage irrigated	43,500	46,000	55,600	70,200	[1] 74,000
Number of farms irrigated	1,169	1,237	1,406	1,606	[1] 1,658
Miles of canal operated	256	335	315	382	457
Maximum water stored (acre-feet)	260,000	290,500	308,500	435,500	433,500
Water diverted (acre-feet)	[2] 387,300	[2] 442,000	466,300	440,200	.....
Water delivered either to heads of sublaterals or to land (acre-feet)	([3])	336,170	327,100	304,172	.....
Per acre of land in crop (acre-feet)	([3])	7.3	5.9	4.3	.....

[1] Estimated. [2] Includes some water returned to the river. [3] Data not available.

SETTLEMENT.

The population on the project farms in 1912 was estimated at 4,800, with an additional 2,200 in the towns. While there has been a steady, healthy growth of the project population during the last three years, it has been more noticeable in the towns than on the farms. Building operations have been numerous and of a permanent character, and the towns have made very satisfactory progress. Many farms have been subdivided and sold in whole or part, and there is a constant tendency toward smaller holdings of lands. Approximately 40 per cent of the original settlers are still on the project. No data are available as to the number of relinquishments and assignments, but it is apparent that land is passing into new ownership, and new settlers are taking the places of the pioneers.

Crop statistics, Minidoka project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa, new	1,259	Ton	1,017	$5,085
Alfalfa, old	21,205	do	64,580	317,469
Alfalfa seed	5	Pound	500	90
Barley	1,586	Bushel	38,169	14,783
Beans	102	do	506	1,514
Sugar beets	2,625	Ton	19,471	96,984
Clover hay	1,242	do	3,160	15,190
Clover seed	11	Pound	1,200	160
Corn	674	Bushel	9,693	4,269
Garden	620			15,501
Hay, mixed	1,360	Ton	2,866	13,787
Oats	10,970	Bushel	316,842	100,939
Pasture	4,642			33,504
Peas	55	Bushel	812	1,454
Potatoes	3,575	do	419,786	107,008
Rye	547	do	3,218	1,466
Timothy	235	Ton	217	1,113
Timothy seed	119	Pound	24,010	1,775
Turnips, carrots, etc	7	Ton	37	194
Wheat	10,534	Bushel	183,905	118,469
Less duplicated area	319			
Total cropped	61,054			850,754
Other purposes	9,184			
Total irrigated	70,238			

ORDER DATED OCTOBER 10, 1912.

Whereas, by order of May 13, 1912, it was provided that the water users under the South Side pumping unit of the Minidoka project, Idaho, who were subject to the order of March 24, 1911, might receive water for irrigation in the season of 1912 without prior payment of the rental charge for operation and maintenance then due, amounting to $1.10 per acre of irrigable land, subject to certain conditions, and

Whereas, one of the conditions was that the charge per acre of irrigable land should be $1.20 per acre instead of $1.10 per acre if paid on or before December 1, 1912.

Now, therefore, by virtue of the authority given me by the act of Congress approved June 17, 1902 (32 Stat., 388), known as the reclamation act, and by acts amendatory thereof and supplementary thereto, it is hereby ordered:

That water users under said pumping unit who, having availed themselves of the benefits of the said order of May 13, 1912, desire to make payment of said rental charge on or before November 1, 1912, shall be allowed a discount of 5 cents per acre and payment of such charge will be accepted on or before said date at the rate of $1.15 per acre.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

ORDER DATED MARCH 25, 1913.

1. Whereas, under the provisions of orders heretofore issued, water has been furnished on a rental basis for 1911 and 1912, to lands in the South Side pumping unit of the Minidoka project, Idaho; and

2. Whereas a number of settlers or landowners are financially unable to comply with said orders and pay in full the rental charges

heretofore announced for the seasons of 1911 and 1912, before water is furnished in 1913, and it is desired to continue the development of the lands by irrigation during the season of 1913.

3. Now, therefore, it is hereby ordered that water be furnished for the season of 1913 to all lands as applied for, upon which a payment of not less than 25 cents per acre for each of the years 1911 and 1912 shall have been made on account of the amounts due for said years, and in addition thereto payment must be made in full of the portion of the charge which accrued on account of the use during June, July, and August, 1912, of water in excess of 1.75 acre-feet in cultivation, as set forth in order dated March 19, 1912. No water will be furnished in the season of 1913 for any lands for which payments have not been made as herein required. The remainder of the amounts due for said years will be paid as hereafter announced.

4. The minimum rental charge for the season of 1913 shall be $1.10 per acre of irrigable land, whether or not water is used thereon.

5. For that portion of the season beginning June 1 and ending August 31, 1913, the maximum amount of water which will be furnished for the minimum charge named in paragraph 4 is 1.75 acre-feet per acre of irrigable land actually under cultivation, approximately equal portions of said amount to be delivered during each month of the said period, at approximately a uniform rate so far as practicable, and not in excess of the applicant's proportionate share of the available water supply and capacity of the works; provided, however, that a rotation system of delivery may be installed to encourage the economical use of water, but in no case shall more water be delivered than is reasonably required for beneficial use.

6. The water used on any farm unit during June, July, and August, 1913, in excess of 1.75 acre-feet per acre of land actually in cultivation thereon, shall be charged for at the rate of 20 cents per acre-foot, as measured by the engineers of the Reclamation Service.

7. All rental charges for 1913, including both the minimum rate and the acre-foot charge, shall be due on December 1, 1913, and payable to the proper agent of the United States Reclamation Service, at Burley, Idaho. No water will be furnished to any farm unit in 1914, or subsequent seasons, until all charges due against such unit will have been paid as hereafter required.

8. This is a preliminary order, made prior to completion of the project, to provide for the rental of water during the season of 1913 only, and is not to be construed as the public notice for said project, or any part thereof.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, Minidoka project. June 30, 1913.

ASSETS.

Accounts receivable:		
Water rentals	$73,193.99	
Miscellaneous rentals	197.53	
Miscellaneous	1,855.17	
Water rentals, building charges	38,890.23	
Water rentals, operation and maintenance charges	84,359.69	
		$198,496.61

Inventories:			
Equipment in use—			
Animals	$6,605.33		
Mechanical and other	19,099.05		
		$25,704.38	
Materials, supplies, etc., in storehouse		55,938.72	
Cement		705.63	
Structural iron and steel		3,326.44	
Lumber		16,421.75	
Explosives		924.85	
Forage		793.09	
Fuel		688.21	
Products of local operations		2,193.96	
Goods in transit		1,228.40	
Unadjusted transfers between projects		3,923.61	
			$111,849.04
Improvements to land:			
Gross cost		3,979,257.38	
Less credits from incidental operations—			
Rentals, cottages	$2,368.18		
Rentals, grazing lands	110.00		
Rentals, irrigation water	19,836.25		
Revenues, miscellaneous	71.50		
Loss on mess operations	[1] 5,217.27		
Profits, hospital	545.00		
Profits, miscellaneous	84.37		
Adjustments—			
Contractor's freight refunds	308.60		
Forfeitures by defaulting bidders and contractors	25.00		
		18,131.63	
			3,961,125.75
Deferred operation and maintenance revenues			349,672.24
Total assets			4,621,143.64

LIABILITIES.

Accounts payable:			
Labor		14,352.46	
Purchases		9,896.93	
Contract estimates		15,848.71	
Freight and express		10,153.99	
Passenger fares		206.35	
Meal tickets		1,253.14	
			51,711.58
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	$331,979.42		
Building advance collections	167,707.61		
Building collections forfeited	6,667.78		
		506,354.81	
For depreciation on plant and equipment		2,158.72	
			508,513.53
Unadjusted credits, net earnings of Government animals			1,244.81
Net investment:			
Disbursement vouchers	$4,532,980.35		
Transfers received	181,305.63		
		4,714,285.98	
Less—			
Collection vouchers	580,475.90		
Transfers issued	74,136.36		
		654,612.26	
			4,059,673.72
Total liabilities			4,621,143.64

[1] Deduction.

Assets and liabilities, Snake River storage unit, June 30, 1913.

ASSETS.

Accounts receivable, water rentals			$1,425.54
Inventories:			
Equipment in use, mechanical and other		$6,896.32	
Materials, supplies, etc., in storehouse		1,332.59	
Cement		135.50	
Structural iron and steel		386.44	
Forage		772.66	
			9,523.51
Improvements to land:			
Gross cost		469,674.19	
Less credits from incidental operations—			
Rentals of cottages	$186.00		
Rentals grazing lands	320.00		
Rentals irrigation water	31,801.52		
		32,307.52	
			437,366.67
Total assets			448,315.72

LIABILITIES.

Accounts payable:			
Purchases		15.85	
Freight and express		467.86	
Passenger fares		27.40	
			511.11
Net investment:			
Disbursement vouchers	477,653.53		
Transfers received	63,784.37		
		541,437.90	
Less—			
Collections, vouchers	30,656.38		
Transfers issued	62,976.91		
		93,633.29	
			447,804.61
Total liabilities			448,315.72

Assets and liabilities, Jackson Lake enlargement unit, June 30, 1913.

ASSETS.

Cash; in special financial agents' possession awaiting remittance			$56.85
Inventories:			
Mercantile stores		$1,135.05	
Equipment in use—			
Animals	$310.00		
Mechanical and other	1,229.03		
		1,539.03	
Materials, supplies, etc., in storehouse		5,417.95	
Cement		35.00	
Iron and steel		6.49	
Explosives		435.86	
Forage		276.72	
Fuel		120.00	
Unadjusted transfer between projects		1,162.58	
Undistributed cost (freight and handling on inventory property)		213.24	
			10,341.92

Improvements to land:			
Gross cost		$13,216.27	
Less credits from incidental operations—			
Rentals of cottages	$6.00		
Loss on mess operations	[1] 108.43		
Profits on hospital operations	112.00		
		9.57	
			$13,206.70
Total assets			23,605.47

LIABILITIES.

Accounts payable:			
Labor		3,712.79	
Purchases		8,856.24	
Freight and express		34.96	
Passenger fares		201.45	
			12,805.44
Reserves, building advance collections			221,541.85
Net earnings of Government animals			24.84
			234,372.13
Net investment:			
Disbursement vouchers	5,257.44		
Transfer vouchers received	5,526.75		
		10,784.19	
		10,784.19	
Less collection vouchers		221,550.85	
			210,766.66
Total liabilities			23,605.47

Feature costs, Minidoka project, to June 30, 1913.

Gravity system:			
Diversion dam and spillway			$577,127.68
Main canals, north and south side—			
Earthwork		$687,046.27	
Structures		81,614.43	
West end extension		52,673.23	
			821,333.93
Distribution system:			
Earthwork		358,457.20	
Structures		204,405.80	
			562,863.00
Pumping system, power plant at dam:			
Buildings		99,753.78	
Machinery and installation		262,397.03	
Enlargement of diversion channel		59,748.03	
Operation and maintenance of, when not charged to operation and maintenance of project		14,421.58	
			436,320.42
Pumping system, pumping stations:			
Temporary plant, south side		9,617.65	
Station No. 1, machinery, pressure pipe, and camp No. 1		168,252.46	
Station No. 2, machinery, pressure pipe, and camp No. 2		160,228.57	
Station No. 3, machinery, pressure pipe, and camp No. 3		95,510.14	
Operation and maintenance of, when not charged to operation and maintenance of project		24,125.94	
Station No. 4, west end pumping		16,673.12	
			474,407.88
Commercial power building, transformer substation			21,283.18

[1] Deduct.

Wasteways and feeders:		
Earthwork	$377,764.12	
Structures	194,026.65	
Operation of canal system when not charged to operation and maintenance of project	45,688.58	
		$617,479.35
Transmission system:		
Building	53,628.96	
Operation	1,495.97	
		55,124.93
Telephone system:		
Building	26,851.66	
Operation	2,453.97	
		29,305.63
Real estate (rights and property, lands purchased)		35,451.54
Buildings, construction		74,669.05
Irrigable lands, farm units, subdivisions		3,720.16
Roads and highways:		
Construction	3,826.46	
Maintenance	2,193.59	
		6,020.05
Wells, drilling		3,127.06
Examination of project as a whole		75,969.58
Administration of project as a whole:		
General expense, undistributed	146,526.98	
Engineering, undistributed	34,878.91	
Beneficial use of water	3,648.05	
		185,053.94
Total building cost		3,979,257.38
Operation and maintenance:		
Gravity system—		
Telephone system	10,221.03	
Experimental farm	11,932.62	
Dam and headworks	1,293.95	
Canal and sublateral system	121,166.68	
Water from Jackson Lake Dam	11,588.33	
Engineering charges	14,654.09	
Hydrography	3,310.61	
Administration	62,823.90	
Wasteway system	391,513.25	
		628,504.46
Pumping system—		
Telephone system	3,599.04	
Power division	56,895.32	
General expense, canal division	20,881.67	
Canal division	53,401.17	
Water from Jackson Lake	1,812.54	
Hydrography	4,235.86	
		140,825.60
Commercial power		18,177.93
Total operation and maintenance cost		787,507.99
Total building and operation and maintenance cost		4,766,765.77

SNAKE RIVER STORAGE UNIT.

Swan Valley Reservoir		11,374.74
Jackson Lake Dam (temporary)		31,119.30
Jackson Lake Dam (permanent):		
Administrative expense	3,032.07	
Investigations and surveys	6,773.05	
Reservoir right of way	3,426.50	
Testing	7,264.86	
Grovont Bridge investigation	191.03	
Buildings and quarters	32,870.41	

Jackson Lake Dam (permanent)—Continued.		
Ashton Moran road construction	$17,366.64	
Telephone line construction	5,302.43	
Diversion works	55,832.29	
Excavating for foundation	20,556.36	
Dam proper	203,008.75	
River channel improvements	37,464.42	
Protection works	20,408.42	
Operation and maintenance during construction	13,682.92	
		$427,180.15
Total Snake River storage unit		469,674.19
Total building and operation and maintenance cost of project (during construction)		5,236,439.96

Operating revenues and expenses, Minidoka project, to June 30, 1913.

EXPENSES.

Undistributed expenses	$787,507.99

REVENUES.

Operation and maintenance accruals	278,012.31
Operation and maintenance forfeitures	1,631.24
Operation and maintenance advance collections	1,234.96
Rental of lands and buildings	301.00
Rental of power and light	19,598.60
Rental of irrigation water	135,426.15
Miscellaneous revenues	1,631.49
Deferred operation and maintenance revenues	349,672.24
	787,507.99

Estimated cost of contemplated works, Minidoka project.

Dam and spillway, sluice gates in spillway	$14,000
Distribution system, gravity:	
Works for watering land under A–4 raise and 212 extension	20,600
Purchase sublaterals from settlers	4,000
Rebuilding sublaterals	60,000
Installation measuring devices	12,000
Distribution system, south side pumping:	
Miscellaneous structures	14,000
Lateral construction	3,000
Power plant:	
Three 4-room cottages and remodeling other buildings	6,100
Miscellaneous work on power house	3,000
Pumping stations, new runners for pumps	22,000
Commercial power:	
Additional equipment, Rupert substation	6,000
Substation Burley	10,000
Substation Marshfield	3,500
Substation Minidoka	3,500
Transmission line, second lift to Burley	13,000
Transmission line, Heyburn to Burley	2,000
Transmission line, Minidoka to dam	6,500
Miscellaneous power deliveries	3,000
West End pumping	10,000
Wasteway construction	200,000
Total	416,200

KANSAS, GARDEN CITY PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Finney and Kearney.
Townships: 23 and 24 S., Rs. 32 to 34 W., sixth principal meridian.
Railroad: Atchison, Topeka & Santa Fe.
Railroad stations and estimated population January 1, 1913: Garden City, 3,500; and Deerfield, 200.

WATER SUPPLY.

Source of water supply: Shallow wells near Arkansas River, and natural flow from the river.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: No water being supplied by Reclamation Service, on account of failure of water users to pay back charges.
Length of irrigating season: From April 1 to October 31—214 days.
Average elevation of irrigable area: 2,925 feet above sea level.
Average annual rainfall on irrigable area: 19 inches; 1912, excluding month of October, 18.35 inches.
Range of temperature on irrigable area: —20° to 105° F.
Character of soil of irrigable area: Fertile black sandy loam.
Principal products: Alfalfa, sugar beets, melons, sweet potatoes, small fruits.
Principal markets: Garden City, Kans.; Kansas City, Mo.; Chicago, Ill.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 6, 1908, and November 30, 1908.
Location of lands opened: Ts. 23 and 24 S., Rs. 32, 33, and 34 W., sixth principal meridian.
Irrigable lands opened: 10,677 acres, all in private ownership.
Limit of area of farm units: 160 acres.
Duty of water: 2 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $37.50.
Annual operation and maintenance charge: $2.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers September 5, 1905.
Construction authorized by Secretary October 5, 1905.
Power plant completed July, 1907.
Conduit and siphon completed July, 1907.
First irrigation by Reclamation Service, season of 1908.
Wells completed, April, 1908
Pumps: 10 installed in 1907, 13 installed in 1908.
Entire project 98 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Garden City project provides for the utilization by pumping of the underground flow of the Arkansas River Valley to supplement the normal flow of Arkansas River distributed through the Farmers ditch to irrigate lands northwest of Garden City, Kans.

A power house is located on the main line of the Atchison, Topeka & Santa Fe Railroad at Deerfield, Kans., and electrical energy is transmitted to 23 pumping stations, located along a concrete-lined canal 20,000 feet in length.

The pumps are connected at 3 of these stations to 12 15-inch wells each, and at 20 stations to 9 wells each. All of the features of this plan are completed.

CONSTRUCTION DURING FISCAL YEAR.

There has been no construction work in progress during the fiscal year.

OPERATION AND MAINTENANCE.

Payment of the Reclamation Service charges has not been made since 1909, and inasmuch as the public notices which have been issued provide that no water shall be furnished in any irrigation season until the operation and maintenance charges of the previous season have been paid, the plant at Garden City has been closed, and future operations will depend upon the action of the settlers. During the past two years effort has been made to stimulate the farmers under the project to a recognition of the value of the pumping plant as a supplemental source of supply, by the use of which at critical times crops are insured, wholly saved, or doubled in yield. The conditions around Garden City, with its sugar factory and excellent transportation facilities, are such that the farmers, under intelligent management, should be able to pay a large price for water during times of drought and make substantial profits, but the water users apparently do not take kindly to any system of payment for water as needed to supplement the natural river flow, nor are they willing to enter into any orderly arrangement such as has been adopted by other irrigated communities. Without such a system it is, of course, impracticable to proceed successfully, and the service is confronted with the alternative of nonuse of the plant. The plant itself is not a failure, but the people will not try to make it a success. Since 1909 no water has been pumped, and maintenance work has been confined to the necessary care of the plant.

PROPOSED LEGISLATION.

On May 11, 1912, former Senator Curtis, of Kansas, introduced a bill (S. 6784) "for the relief of the Garden City (Kansas) Water Users' Association, and for other purposes," which provided "that the contracts heretofore entered into between the Finney County Water Users' Association, of Finney County, Kansas, or with individual landowners, with the Secretary of the Interior for the supply and use of water from the Government water plant be, and the same are hereby, canceled and relieved, and the liens upon the lands in said county created by such contracts are hereby released and discharged."

This bill was submitted to the Secretary of the Interior for his views, and on June 3, 1912, he suggested to the chairman of the Senate Committee on Irrigation and Reclamation of Arid Lands that the bill be amended to read as follows:

> That the Secretary of the Interior be, and hereby is, authorized to have appraised, and dispose of at not less than the appraised value, at public or private sale, by sealed bids or otherwise, under such terms as may be approved by him, the irrigating plant built under the terms of the reclamation act of June seventeenth, nineteen hundred and two (Thirty-second Statutes at Large, page three hundred and eighty-eight), located in Finney County, Kansas, together with the machinery, wells, pumps, transmission lines, and all other appurtenances, and the lands of the United States on which they are located,

either as a whole or separately in his discretion. The Secretary of the Interior is hereby authorized to execute appropriate conveyances for the real property sold hereunder.

Sec. 2. That the contracts heretofore entered into between the Finney County Water Users' Association, or Finney County, Kansas, or with individual landowners, and the Secretary of the Interior for the supply and use of water from the irrigation plant of the United States be, and the same are hereby, canceled and relieved and the liens upon the lands in said county created by such contracts are hereby released and discharged.

The bill was passed by the Senate on July 3, 1912, in this form, with the addition of a further section directing that the "Secretary of the Interior shall make to Congress a statement of the expenditure connected with this reclamation project and the amount received from its sale."

On August 26, 1912, the chairman of the House Committee on the Irrigation of Arid Lands transmitted to the Secretary of the Interior a letter and memorandum relative to the various matters in controversy in connection with the operation of the plant at Garden City, and requested that the facts "be laid before the Attorney General, together with copies of the contract entered into with the Finney County Water Users' Association, and that opinion be had from him as to the validity of this contract and as to whether the association is obligated to repay the investment made and whether there is any way by which this amount may be collected." This was done, and on January 11, 1913, the Attorney General called attention to the fact that he is authorized "to give his opinion only on any questions of law arising in the administration of another department"; that the questions submitted "are all, in their nature, judicial questions to be determined by the courts rather than by this department," and declined to render an opinion.

On April 7, 1913, a similar bill, S. 221, was introduced by Senator Thompson, of Kansas.

FINANCIAL STATEMENTS.

Assets and liabilities, Garden City project, June 30, 1913.

ASSETS.

Inventories:			
Equipment in use, mechanical and other		$3,761.34	
Materials, supplies, etc., in storehouse		2,194.24	
Unadjusted transfer between projects		125.00	
			$6,080.58
Improvements to land:			
Gross cost		388,256.76	
Less credits from incidental operations—			
Rentals of cottages	$499.58		
Equipment	13.00		
Profits on mess operations	860.82		
Profits hospital	585.58		
Contractors' freight refunds	1,911.73		
Forfeitures by defaulting bidders and contractors	5,800.00		
		9,670.71	
			378,586.05
Total assets			384,666.63

LIABILITIES.

Accounts payable, contract holdbacks		$3,711.86
Net investment:		
Disbursement vouchers	$379,566.69	
Transfers received	11,381.28	
	390,947.97	
Less—		
Collection vouchers	$4,681.20	
Transfers issued	5,312.00	
	9,993.20	
		380,954.77
Total liabilities		384,666.63

Feature costs, Garden City project, to June 30, 1913.

Power station:		
Power house and generating machinery, Deerfield, Kans.	$82,148.12	
Power-house accessories	26,637.43	
		$108,785.55
Transmission line and electric installation (transmission line, pump house, electric lighting, etc.)		15,410.75
Pumping station:		
Pumping houses and pumping units	$55,392.13	
Supply wells	53,489.51	
		108,881.64
Canal system:		
Earthwork	59,038.14	
Structures	29,595.63	
		88,633.77
Real estate (rights and property), land purchased		1,349.23
Buildings		5,907.46
Irrigable lands, farm-unit subdivisions		285.66
Preliminary examination, proposed extension of project		7.89
Administration of project as a whole		7,610.83
Operation and maintenance (during construction):		
Operation	719.67	
Telephone line	4.19	
Transmission line	9.63	
Power plant	31,241.80	
Power-plant accessories	1,541.75	
Miscellaneous operating charges	11,713.58	
Canal system	3,175.25	
Care of plant during nonuse	2,978.11	
		51,383.98
Total building and operation and maintenance cost (during construction)		388,256.76

MONTANA, BLACKFEET (INDIAN) PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Teton.

Townships: 31 to 34 N., Rs. 5 to 10 W.; 29 N., R. 8 W.,; 30 N., Rs. 6 to 9 W.; and 35 N., Rs. 6 and 7 W., Montana meridian.

Railroad: Great Northern.

Railroad stations and estimated population, January 1, 1913: Browning, 250; Blackfoot, 50; Bombay; Seville; Garnet; Glacier Park, 100; and Cut Bank, 800.

WATER SUPPLY.

Source of water supply: Cut Bank, Two Medicine, Badger, Birch, Whitetail, and Blacktail Creeks.

Area of drainage basins: 1,700 square miles.

Annual run-off in acre-feet: Cut Bank Creek at Cut Bank (971 square miles), 1906 to 1912—Maximum, 269,000; minimum, 100,210; mean, 192,800. Two

Medicine Creek at Family (368 square miles), 1907 to 1912—Mean, 322,000.
Badger Creek at Family (224 square miles), 1907 to 1912—Mean, 182,000.
Birch Creek at Dupuyer (155 square miles), 1907 to 1912—Mean, 115,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to furnish water, season 1913: 26,649 acres.
Area irrigated season of 1913: None to June 30.
Length of irrigating season: May 1 to September 30, 153 days.
Average elevation of irrigable area: 3,850 feet above sea level.
Average annual rainfall on irrigable area: 16 inches; 10.32 inches in 1912.
Range of temperature in irrigable area: —44° to 100° F.
Character of soil of irrigable area: Principally rich sandy loam; some gravelly loam and gumbo.
Principal products: Hay, grain, and vegetables.
Principal markets: Great Northern Railway towns from St. Paul to the Pacific coast. Local demand for hay for stock feeding.

LANDS OPENED TO IRRIGATION.

No lands have been opened to irrigation by public notice. All lands covered by canals are allotted to Indians.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1907.
Construction work on the Two Medicine unit begun in July, 1908.
Surveys of Two Medicine Lake Dam begun in fall of 1909.
Construction of Two Medicine Lake Dam begun in July, 1911.
Location surveys of Badger-Fisher unit begun in April, 1911.
Construction of Badger-Fisher unit begun in June, 1911.
Two Medicine unit, 71.6 per cent completed, June 30, 1913.
Badger-Fisher unit, 40 per cent completed, June 30, 1913.
Entire project, 25.8 per cent completed, June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Blackfeet project provides for five irrigation systems on the Blackfeet Indian Reservation, as follows: (1) The Carlow Canal system, heading on the right bank of Cut Bank Creek and supplying water for 18,000 acres of land near Carlow and Seville stations on the Great Northern Railway; (2) the Cut Bank Canal system, heading on the left bank of Cut Bank Creek and supplying water for 20,000 acres of land north and east of the creek, 11,000 acres of which are outside the reservation; (3) the Two Medicine Canal system, diverting from the left bank of Two Medicine River and supplying water through the North Branch Canal, the Spring Lake Reservoir, and South Branch Canal to 48,000 acres of land; (4) the Badger Canal system, diverting water from the right bank of Badger Creek, supplying water direct through a feeder canal to 3,000 acres of land on Piegan Flats and through Four Horns Supply Canal and Reservoir to 33,000 acres of land between Badger and Birch Creeks; and (5) the Birch Creek Canal system, diverting from Birch Creek, and supplying water to 3,500 acres of land between Birch and Blacktail Creeks. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The irrigable lands of the project are located in general in the southeastern portion of the Blackfeet Indian Reservation, between Cut Bank and Birch Creeks. Of the above irrigation plan, the first development of the Two Medicine Canal system has been completed, including 36 miles of main canal, with headworks and other structures and a distributing system to deliver water to approximately 24,000 acres of land complete with structures. On the Badger unit a small canal diverts water from Badger Creek direct to approximately 3,000 acres of Piegan Flats. A supply canal 12 miles long is completed, except for a structure at the crossing of Whitetail Creek, which will divert the water of Badger Creek into Four Horns Reservoir, where storage will be available by

proposed construction of dam and controlling works. Water from this storage will follow a natural channel to Blacktail Creek, from which it is diverted into Fisher Canal, designed to irrigate approximately 30,000 acres on Fisher Flats. Approximately 10 miles of the earthwork of this canal is completed, and the main canal and all distributaries to cover the allotted lands are cross-sectioned. The Carlow, Cut Bank, and Birch units remain to be constructed upon the completion of the Two Medicine and Badger units.

CONSTRUCTION DURING FISCAL YEAR.

Two Medicine unit.—On the Two Medicine Dam the concrete spillway and outlet structures were entirely completed and the earth embankment 93 per cent completed.

Badger unit.—The headgates for the Four Horns Canal of the Badger unit were built and the canal excavation completed. Approximately 10 miles of the Fisher Canal diverting from Blacktail Creek were excavated and cross-drainage culverts placed.

Surveys.—Canal location on the Fisher Flats and topographic surveys of the Birch Creek unit were completed.

OPERATION AND MAINTENANCE.

No water has been delivered to the land for irrigation purposes. Maintenance work was done on the Two Medicine Canal, and both this and the Piegan unit are ready for irrigating, with a total irrigable area of 26,649 acres.

SETTLEMENT.

Land under the project has not been opened for settlement; 46,000 acres have been allotted to Indians, but have not yet been settled upon by them or farmed.

PRINCIPAL CROPS.

The principal crops will be hay, grain, and vegetables. No land under the irrigation system has been farmed.

FINANCIAL STATEMENTS.

Assets and liabilities, Blackfeet project, June 30, 1913.

ASSETS.

Cash in special financial agents' possession awaiting remittance			$196.37
Accounts receivable:			
Miscellaneous		$179.99	
Miscellaneous, Office of Indian Affairs		22,352.91	
			22,532.90
Inventories:			
Mercantile stores		10,658.77	
Equipment in use—			
Animals	$16,751.33		
Mechanical and other	18,142.93		
		34,894.26	
Materials, supplies, etc., in storehouse		3,429.94	
Cement		1,222.76	
Structural iron and steel		1,999.67	

Inventories—Continued.			
Lumber		$1,402.36	
Explosives		849.05	
Forage		2,048.24	
Fuel		15.00	
Goods in transit		1,441.79	
Unadjusted transfer between projects		[1] 6,266.99	
Undistributed cost (freight and handling on inventory property)		[1] 150.93	
			$51,543.92
Improvements to land:			
Gross cost		763,122.17	
Less credits from incidental operations—			
Rentals of cottages	$305.09		
Rentals of telephones	334.60		
Profits on mess operations	8,062.62		
Profits, mercantile stores	19,330.77		
		28,033.08	
			735,089.09
Total assets			809,362.28
LIABILITIES.			
Accounts payable:			
Labor		$16,138.28	
Purchases		10,024.31	
Freight and express		844.55	
Passenger fares		98.10	
Coupons		580.61	
			27,685.85
Reserves, building charges accrued			699,999.65
Unadjusted credits, net earnings of Government animals			1,741.74
Net investment:			
Disbursement vouchers	756,823.88		
Transfers received	73,498.11		
		830,321.99	
Less—			
Collection vouchers	695,617.14		
Transfers issued	54,769.81		
		750,386.95	
			79,935.04
Total liabilities			809,362.28

Feature costs, Blackfeet project, to June 30, 1913.

Storage works:		
Reservoirs, Two Medicine Lake Reservoir	$3,050.78	
Dam construction, Two Medicine Lake Reservoir	125,465.55	
Roads and bridges, Two Medicine Lake Reservoir	2,294.44	
Buildings and grounds, Two Medicine Lake Reservoir	3,689.60	
Reservoir, Badger division	310.92	
		$134,811.29
Diversion works:		
Headworks, Two Medicine division	17,041.77	
Diversion dam	97.95	
Feeder canal headworks, Badger division	6,067.16	
		23,206.88
Canal system:		
Main Canal, division 1, Two Medicine division	253,514.20	
Main Canal, division 2, Two Medicine division	55,333.01	
South Canal, Two Medicine division	3,161.43	
Supply Canal, Badger division	106,579.68	
Main Canal, Badger division	59,430.45	
Main Canal, Birch Creek division	615.79	
		478,634.56

[1] Deduct.

Lateral system:		
Main Canal, Two Medicine division	$44,670.71	
South Canal, Two Medicine division	2,170.22	
Main Canal, Badger division	7,694.91	
Piegan Flats, Badger division	21,510.88	
		$76,046.72
Distributing reservoir and works:		
Spring Lake Reservoir, Two Medicine division	1,554.91	
Four Horns Reservoir	1,043.04	
		2,597.95
Telephone line:		
Construction	6,460.55	
Maintenance	608.14	
		7,068.69
Roads and bridges		5,209.98
Buildings and grounds:		
Construction	15,817.61	
Maintenance	3,154.55	
		18,972.16
Administration of project as a whole		8,952.14
Examination of project as a whole:		
Examination (surveys)	2,635.78	
Hydrography	3,985.97	
		6,621.75
Inventory of cost ledger supplies		1,000.05
Total building cost		763,122.17

Estimated cost of contemplated works, Blackfeet project.

General	$40,960.00
Two Medicine division:	
Storage works	141,215.00
Diversion works	17,140.00
Distributing reservoirs and works, surveys, estimates, etc	1,560.00
Main Canal	317,355.00
Distributing system	46,850.00
Roads and bridges	5,210.00
Badger division:	
Storage works	310.00
Diversion works	6,070.00
Distributing reservoirs and works, surveys, designs, etc	17,000.00
Four Horns Supply Canal	115,000.00
Distributing system	9,000.00
Piegan Canal	22,710.00
Birch Creek division:	
Main Canal	310.00
Inventories	37,675.00
Total	778,365.00

MONTANA, FLATHEAD (INDIAN) PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Flathead, Missoula, Sanders.

Townships: 15 to 25 N., Rs. 17 to 25 W., Montana meridian.

Railroad: Northern Pacific.

Railroad stations and estimated population, Jan. 1, 1913: Evaro, 39; Arlee, 121; Ravalli, 75; Dixon, 175, and Perma, 35.

WATER SUPPLY.

Source of water supply: Flathead, Jocko, and Little Bitter Root Rivers; Mud, Crow, Post, Mission, Dry, Finley, Agency, Big Knife, and Valley Creeks, and about 60 smaller streams.

Area of drainage basin: 8,000 square miles.

Annual run-off in acre-feet of Flathead River at Polson, 1908 to 1912: Maximum, 8,860,000; minimum, 7,455,000; mean, 8,293,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 38,000 acres.

Area under water rental applications, season of 1913: 11,444 acres.

Length of irrigating season: May 1 to September 30—153 days.

Average elevation of irrigable area: 3,000 feet above sea level.

Average annual rainfall on irrigable area: At St. Ignatius, Mont., station, 16.24 inches: 1912, 16.7 inches; probably less on average area.

Range of temperature on irigable area: —30° to 96° F.

Character of soil of irrigable area: Varies from light sandy loam to heavy clay.

Principal products: Grain, hay, apples, vegetables, small fruits and cattle.

Principal markets: Missoula, Butte, Anaconda and other mining and lumber towns and camps.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Proclamation of the President, May 22, 1909, opened lands to filing under certain rules as to registration, etc., first filing to be May 2, 1910.

Location of lands opened: Ts. 17 to 24 N., Rs. 19 to 24 W., Montana meridian.

Present status of irrigable area opened: About 70,000 acres have been entered; 2,000 acres open to entry; 75,000 acres in private ownership, mostly Indian allotments held under trust patents; 5,000 acres of State lands.

Limit of area of farm units: 160 acres. Average irrigable, about 40 acres.

Duty of water: Works will provide about 1.5 acre-feet per acre per annum at the farm.

Building charges: Not fixed.

Annual operation and maintenance charges: $1 per acre-foot; minimum charge, $1 per acre, 1913.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1907.

Construction authorized and first appropriation made by act of Congress approved April 30, 1908.

Topographic surveys and canal location begun June, 1908.

Construction of canals in Jocko, Mission, and Polson divisions begun 1909.

Construction of Newell Tunnel begun in June, 1909.

Irrigation begun in Jocko and Mission divisions in 1910.

Constructon of Pablo Feeder Canal begun in July, 1910.

Construction of Post Canals and Ninepipe Reservoir begun in 1910.

Construction of Kickinghorse Feeder Canal begun in 1911.

Construction of Ninepipe Feeder Canal begun in 1911.

Irrigation in Post division begun in 1911.

Kickinghorse Feeder Canal completed in 1912.

Irrigation in Polson and Pablo divisions begun in 1913.

Construction of Pablo Dams and Canals under Contract No. 407 completed in 1913.

Per cent completed on June 30, 1913: Entire project, 18 per cent; Jocko division, 84 per cent; Mission division, 11.6 per cent; Post division, 37.7 per cent; Crow division, 3 per cent; Pablo division, 47 per cent; Polson division, 13.3 per cent; Big Arm division, 14.5 per cent; Camas division, 0.5 per cent.

IRRIGATION PLAN.

The irrigation plan of the Flathead project provides for the irrigation of about 152,000 acres of land in various parts of what was the Flathead Indian Reservation, water being diverted from creeks and rivers rising in the Mission Mountains and conducted by canals directly to the land and to reservoirs for the storage of flood water. About 12 reservoirs will be constructed. Some of these are lakes the capacity of which will increase and others natural basins

which will require only the building of embankments at low points. The water supply will be supplemented when necessary by pumping from Flathead Lake. Irrigable tracts on the Jocko, Mission, Post, Pablo, and Polson divisions, which contain the largest percentage of irrigable land allotted to the Indians, have been selected for the first development. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The following principal features have been completed: A distribution system covering approximately 5,000 acres of land north of the Jocko River, taking water from the Jocko River; a distribution system covering 6,000 acres on the south side of Jocko River, using the Finley, Agency, and Big Knife Creeks and Jocko River as water supply; Mission Lateral B, covering approximately 5,000 acres of land between Mission and Post Creeks; a distribution system covering 16,000 acres of land lying under the Ninepipe Reservoir; the Pablo Feeder Canal from Post Creek to the North Pablo Reservoir; a distribution system covering about 2,000 acres lying under Kickinghorse Dam site; a distribution system covering about 4,000 acres lying under Pablo Reservoirs; and a distribution system covering about 1,000 acres lying under the Pablo Feeder Canal on the Polson Slope. Pablo dams have been completed to hold about 5,000 acre-feet and Ninepipe Dam to hold about 5,000 acre-feet.

CONSTRUCTION DURING FISCAL YEAR.

Pablo division.—Contract work during the year brought the Pablo dams to approximate completion for 5,000 acre-feet storage. One large rock-paved drop and several small concrete drops and turnouts were constructed. During the winter 5,700 square yards of rock paving were placed on the faces of the Pablo dams.

Polson division.—A canal was constructed from the Pablo Feeder Canal 2 miles to connect with the Polson Canals, and 1.33 miles of sublaterals were built and structures placed ready for irrigation of about 1,000 acres.

Post division.—A canal was built from Kickinghorse dam site and structures placed ready for serving a portion of the lands below, amounting to about 1,300 acres, but to reach about 2,600 acres when completed. Work was completed on Lateral "A" to cover about 2,500 acres.

A large number of farm turnouts and weirs were placed scattered through the Jocko, Mission, and Post divisions, where called for by settlement of the country under previously built canals.

OPERATION AND MAINTENANCE.

During the calendar year 1912, 111 irrigators applied 8,344 acre-feet of water to 4,203 acres. One hundred and thirty-eight applications for water had been made, but timely rains discouraged irrigation on the part of 27 farmers. To June 30, 1913, 171 water-rental applications had been made, covering 11,444 acres, and 2,685 acre-feet of water had been applied by 110 farmers under water-rental contracts. The rotation system of delivery is in use, having been found necessary for the delivery of sufficiently large heads in some gravelly soils and as a measure of economy in operation in all parts of the project. The average depth of water applied during the year 1912 was 2.45 acre-feet per acre in Jocko division, 0.87 in Mission division, and 0.55 in Post division. It is believed that more should have been applied in Mission and Post divisions where the irrigators were late in beginning irrigation.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Flathead project.

Item.	1910	1911	1912	1913 to June 30.
Acreage for which service was prepared to supply water	10,000	19,000	32,000	38,000
Acreage irrigated	2,191	2,369	4,203	3,366
Number of farms irrigated	.....	40	111	110
Miles of canal operated	.....	46	103	135
Water stored (acre-feet), in flow	.....	1,170	5,562	3,387
Water diverted (acre-feet)	18,857	10,940	21,875	6,308
Water delivered to land (acre-feet)	9,936	4,719	8,344	2,719
Per acre of land irrigated (acre-feet)	4.53	1.99	1.98	0.80

SETTLEMENT.

The number of applications for water in 1911 was 40; in 1912, 138, with 111 actual users; in 1913, 171, with 110 actual users to June 30. The farm population in sections under constructed canals is steadily increasing, but on those portions of the project opened to homestead entry, but still dry, the population is decreasing. It is estimated that in the region west of the Flathead River the population has decreased from 1,000 to about 750 by entrymen commuting and leaving the country, although few relinquish. Inquiry in various quarters, mainly among the newspaper publishers, indicates that the population of the project is about 8,400, of whom about 2,300 are Indians and mixed bloods.

PRINCIPAL CROPS.

New land is generally sowed to wheat or oats the first year or two with a gradually increasing acreage in flax. Comparatively few farmers have so far sowed clovers, but there is a movement in that direction in connection with the introduction of dairy stock and development of the creamery industry.

Crop statistics, Flathead project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	38.5	Ton.....	86	$1,032
Barley	135.7	Bushel..	1,970	985
Clover	49.4	Ton.....	105	1,050
Corn	0.8	Bushel..	20	10
Hay	8.9	Ton.....	13	143
Oats	2,347.6	Bushel..	99,416	29,824
Peas	0.2	...do.....	10	30
Peas and oats	15.0	...do.....	750	562
Potatoes	68.3	...do.....	9,214	4,607
Stock beets	1.6	Ton.....	3	15
Truck	52.9	...do.....	363	9,438
Spring wheat	1,309.7	Bushel..	27,245	15,907
Winter wheat	83.3	...do.....	1,664	998
Pasture	15.3	.....	.....	245
Total cropped	4,127.2	.....	.....	64,846
Other purposes	75.8	.....	.....	.....
Grand total irrigated	4,203	.....	.....	.....

FINANCIAL STATEMENTS.

Assets and liabilities, Flathead project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to special financial agent			$77.45
Accounts receivable, building charges			19,559.02
Inventories:			
Mercantile stores		$1,524.02	
Equipment in use—			
Animals	$10,546.14		
Mechanical and other	37,980.20		
		48,526.34	
Materials and supplies, etc., in storehouse		12,142.01	
Cement		[1] 39.82	
Explosives		685.13	
Forage		3,934.39	
Products of local operations		24,658.55	
Undistributed cost (freight and handling) on inventory		329.23	
			91,759.85
Improvements to land:			
Gross cost		1,122,801.93	
Less credits from incidental operations—			
Rentals of cottages	610.56		
Rentals of irrigating water	7,219.57		
Rentals of telephone lines	2,440.96		
Revenues, miscellaneous	265.31		
Profits on mess operations	14,428.58		
Profits on mercantile stores	7,251.40		
Profits on hospital	885.23		
Contractor's freight refunds	813.85		
		33,915.46	
			1,088,886.47
Total assets			1,200,282.79

LIABILITIES.

Accounts payable:			
Labor		831.16	
Purchases		439.48	
Contract estimates		8,814.45	
Contract holdbacks		14,439.13	
Freight and express		189.71	
Passenger fares		10.35	
			24,724.28
Reserves:			
For amortization of original cost by repayment		1,073,976.28	
For depreciation on plant and equipment		[1] 731.66	
			1,073,244.62
Unadjusted credits, net earnings of Government animals			3,219.61
Net investment:			
Disbursement vouchers	1,134,233.35		
Transfers received	67,283.95		
		1,201,517.30	
Less—			
Collection vouchers	1,084,771.41		
Transfers issued	17,651.61		
		1,102,423.02	
Total liabilities			1,200,282.79

[1] Deduct.

Feature costs, Flathead project, to June 30, 1913.

Headquarters:		
Buildings and grounds	$9,060.77	
Telephone system	8,254.75	
		$17,315.52
Jocko division:		
Survey and design	24,532.16	
Canal system—		
Excavation	63,377.99	
Structures	15,101.85	
Headworks	6,089.63	
Lateral system—		
Excavation	14,755.14	
Structures	4,416.80	
Buildings and grounds, construction	3,301.15	
Bridges and roads	706.98	
Gaging streams	3,353.55	
		135,635.25
Mission division:		
Survey and design	21,801.50	
Canal system—		
Excavation	12,788.85	
Structures	1,235.06	
Headworks	4,490.44	
Lateral system—		
Excavation	1,796.71	
Structures	1,751.15	
Buildings and grounds, construction	3,905.61	
Bridges and roads	8,691.35	
Gaging streams	2,049.63	
Storage works—		
St. Mary Lake Dam	1,557.04	
St. Mary Lake Shaft	1,183.44	
St. Mary Lake Tunnel	4,344.20	
McConnell Reservoir	425.43	
		66,020.41
Polson division:		
Survey and design	8,523.39	
Canal system—		
Excavation	8,198.60	
Structures	5,620.92	
Buildings and grounds, construction	8,888.26	
Bridges and roads—		
Power-plant road	1,486.89	
Shaft camp road	1,719.31	
Roads, general	132.47	
Gaging streams	1,642.74	
Newell Tunnel—		
Sinking shaft	4,461.76	
Driving tunnel	77,790.78	
Nowell Dam	352.68	
Power plant, construction	9,116.89	
Pumping station, plant construction	805.12	
		128,739.81
Little Bitter Root division:		
Survey and design		3,110.61
Camas division:		
Survey and design		707.85
Post division:		
Survey and design	51,892.73	
Canal system—		
Excavation	87,560.72	
Structures	15,875.05	
Headgates	17,567.24	
Lateral system—		
Excavation	8,157.33	

Post division—Continued.		
Buildings and grounds, construction	$231.89	
Bridges and roads	7,100.32	
Gaging streams	1,628.60	
Storage works—		
Land submerged	517.48	
Dam	39,300.92	
Outlet	11,772.92	
		$241,605.20
Crow division:		
Survey and design		8,805.07
Pablo division:		
Survey and design	58,322.95	
Canal system—		
Excavation	101,931.52	
Structures	14,310.79	
Lateral system—		
Excavation	12,520.12	
Structures	2,519.74	
Storage works—		
Land submerged	3,755.53	
Dam	183,489.21	
Reservoir	15,754.05	
Feeder canal	97,608.96	
Buildings and grounds	6,019.26	
Bridges and roads	1,641.23	
Gaging streams	630.03	
		498,503.39
Operation and maintenance:		
Operation	11,303.28	
Maintenance	10,920.64	
		22,223.92
Inventory of cost-ledger supplies		134.90
Total building and operation and maintenance cost (during construction)		1,122,801.93

Estimated cost of contemplated works, Flathead project.

Polson Canals	$500
Pablo storage	20,000
Pablo Canals	141,000
Post storage	1,000
Post Canals	128,000
Mission Canals	1,000
St. Mary storage	400
Jocko Canals	13,000
Telephone system	2,000
Stream gaging	2,400
Operation and maintenance	30,000
Survey and design	20,000
Total	359,300

MONTANA, FORT PECK (INDIAN) PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Valley, Sheridan.

Townships: 26 to 33 N., Rs. 39 to 56 E., Montana meridian.

Railroad: Great Northern.

Railroad stations and estimated population, January 1, 1913: Wiota, Kintyre, Frazer, 10; Oswego, 20; Lohmiller, Wolf Point, 250; Macon, Chelsea, Poplar, 600; Sprole, Brockton, 100; Calais and Blair, Mont.

WATER SUPPLY.

Source of water supply: Missouri and Poplar Rivers; Big Porcupine, Little Porcupine, Wolf, Smoke, and Big Muddy Creeks.

Area of drainage basins: Missouri River, 85,000 square miles; Poplar River, 3,000 square miles.

Annual run-off in acre-feet (1909–1912): Poplar River—mean, 74,300; Big Porcupine Creek at Nashua—mean, 20,000; Little Porcupine Creek near Frazer—mean, 7,000; Wolf Creek at Wolf Point—mean, 6,700; Big Muddy near Culbertson—mean, 24,200.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season 1913: Little Porcupine unit, 2,125 acres; Poplar River unit, 5,000 acres.

Area irrigated, season 1913: 700 acres to June 30.

Length of irrigating season: From April 1 to August 15—137 days.

Average elevation of irrigable area: 2,000 feet above sea level.

Average annual rainfall on irrigable area: 13 inches; 1912, 12.7 inches.

Range of temperature on irrigable area: −40° to 100° F.

Character of soil of irrigable area: Heavy clay and loam.

Principal products: Hay, grain, and vegetables.

Principal market: Local.

LANDS OPENED FOR IRRIGATION.

Pending the opening of the reservation the area to be furnished with water is limited to the Indian allotments. The work of allotting has been practically completed, and the areas allotted in each unit are as follows: Big Porcupine, 2,420 acres; Little Porcupine, 2,125 acres; Missouri Gravity Canal, 64,480 acres; Poplar River, 9,060 acres; Big Muddy, 13,360 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1908.

Construction work on Little Porcupine unit begun September, 1909.

Construction work on Poplar River system begun September, 1910.

Little Porcupine unit 98 per cent completed June 30, 1911.

Construction work on project discontinued temporarily July 31, 1911.

Construction work resumed October 10, 1912.

Entire project 4.7 per cent completed, June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Fort Peck project provides, in so far as the water supply is found sufficient, for the irrigation of lands in various parts of the Fort Peck Indian Reservation and adjacent territory, as follows: (1) 4,000 acres in the vicinity of Wiota station, with flood water supply from the Big Porcupine Creek; (2) 2,000 acres in the vicinity of Frazer, with water supply from Little Porcupine Creek, conserved by storage; (3) 28,000 acres in the vicinity of Poplar and extending along Poplar River a distance of about 35 miles, with water supply from Poplar River, conserved by storage below the forks of Poplar River and West Branch; (4) 16,000 acres lying along the west side of Big Muddy Creek, with water supply from Big Muddy Creek, conserved by storage on Smoke and Wolf Creeks; (5) 50,000 acres of clear bench land and approximately 34,000 acres of brush and timber land extending along the Missouri River, with water supply from the Missouri River by a gravity canal heading near the site of old Fort Peck; (6) 10,000 acres known as the Galpin Bottom, lying above the Missouri River Canal west of Milk River and the Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Gravity Canal, with a lift of about 20 feet; (7) 8,000 acres lying above the Missouri River Canal, east of Milk River, in the Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Gravity Canal, with a

lift of from 10 to 20 feet. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection thorewith.

The features of the above irrigation plan which have been completed are the Little Porcupine unit to irrigate 2,125 acres and the first division of the Poplar River unit to irrigate 5,000 acres of land.

CONSTRUCTION DURING FISCAL YEAR.

Poplar River unit.—Construction of the first two divisions of this unit, consisting of the West Side Canal "B" and the East Side Canal "C," was begun in September, 1910. The "B" Canal, with lateral system and structures to all the allotted area, was completed in July, 1911. The construction of the "C" Canal was continued in 1911 until August, when the work was temporarily discontinued on account of insufficient funds. Work was resumed on this canal in October, 1912, and continued to date. The major structures and 15 miles of the main canal are completed.

FINANCIAL STATEMENTS.

Fort Peck project, June 30, 1913.

ASSETS.

Accounts receivable, miscellaneous			$51,960.68
Inventories:			
Mercantile stores		$2,298.36	
Equipment in use—			
Animals	$3,689.60		
Mechanical and other	8,117.23		
		11,806.83	
Materials, supplies, etc., in storehouse		4,364.23	
Cement		1,934.54	
Structural iron and steel		1,235.76	
Lumber		1,703.76	
Forage		2,298.00	
Fuel		194.73	
Undistributed cost (freight and handling) on inventory property		[1] 369.72	
			25,466.49
Improvements to land:			
Gross cost		272,759.18	
Less credits from incidental operations—			
Rentals of cottages	20.44		
Profits on mess	424.97		
Profits on mercantile stores	6,393.89		
		6,839.30	
			265,919.88
Total assets			343,347.05

LIABILITIES.

Accounts payable:		
Labor	16,450.50	
Purchases	2,253.89	
Freight and express	2,022.54	
Passenger fares	44.40	
Coupons	20.45	
		20,791.78

[1] Deduct.

Reserves:			
For amortization of original cost by repayment		$265,940.32	
For depreciation on plant and equipment		1,507.26	
			$267,447.58
Unadjusted credits, net earnings of Government animals			253.25
Net investment:			
Disbursement vouchers	$248,446.54		
Transfers received	33,202.23		
		281,648.77	
Less—			
Collection vouchers	216,109.11		
Transfers issued	10,685.22		
		226,794.33	
			54,854.44
Total liabilities			343,347.05

Feature costs, Fort Peck project, June 30, 1913.

Survey and designing:			
Galpin division		$2,973.34	
Milk River division		3,296.20	
Frazer division		4,532.63	
Oswego division		3,850.14	
Wolf Point division		2,996.08	
Chelsea division		2,605.79	
Poplar division		3,316.72	
Big Muddy division		112.33	
			$23,683.23
Camps:			
Construction		1,516.78	
Maintenance		1,194.43	
			2,711.21
Water supply, Oswego division			850.67
Stream gauging:			
Galpin division		74.04	
Milk River division		110.93	
Frazer division		110.95	
Oswego division		508.75	
			804.67
Tunnels:			
No. 1, Frazer division (preliminary expense)		1,029.72	
No. 2, Frazer division (preliminary expense)		1,032.30	
			2,062.02
Little Porcupine unit:			
Survey and designing		2,396.86	
Diversion dam and headworks		8,259.85	
Feeder canal		5,228.07	
Crossing under Great Northern Railway		4,618.58	
Small embankments		2,779.92	
Large embankments		6,283.31	
Outlet structures, concrete		2,555.63	
Distributing structures (excavation and structures)		20,384.69	
			52,506.91
Poplar River unit:			
Survey and designing		7,956.72	
Poplar River Dam		8,341.43	
Canal "B" headgates		2,259.97	
Canal "B" excavation		34,830.30	
Canal "B" structures		6,287.71	
Canal "B" distributaries		9,290.58	
Canal "B" distributary structures		3,916.93	
Canal "C" headgates		2,667.03	
Canal "C" excavation		92,707.18	
Canal "C" structures		50.42	
Canal "C" distributaries		737.91	

Poplar River unit—Continued.		
Camp maintenance, No. 1	$3,688.33	
Camp maintenance, No. 2	136.38	
Gauging streams	1,352.44	
Buildings and grounds	4,596.12	
Motorcycle operation	4.50	
Canal "C" flume at station 422	2,042.23	
Canal "C" flume at station 628	714.65	
Canal "C" sluiceways	2,153.99	
Canal "C" defered charges	260.38	
Canal "C" lateral turnouts	1,195.42	
Canal "C" farm turnouts	60.83	
Canal "C" bridges	60.60	
		$185,312.05
Administration of project as a whole, general expense		1,571.85
Inventory of cost ledger supplies		1,291.82
		270,794.43
Operation and maintenance during construction		1,964.75
Total building and operation and maintenance cost		272,759.18

Estimated cost of contemplated works. Fort Peck project.

To complete Poplar River East Canal "C," Poplar River unit:		
Excavation—		
Main canal	$25,500.00	
Distribution system	18,000.00	
Structures	20,000.00	
Miscellaneous	2,500.00	
		$66,000.00
For proposed construction of Big Porcupine Creek Canal system to irrigate 4,000 acres. Capacity of Main Canal 100 second-feet:		
Main Canal, excavation, class 1	26,620.00	
Lateral system, excavation, class 1	26,400.00	
Diversion Dam	7,000.00	
Head gates	2,500.00	
1 drop, concrete	1,500.00	
1 railway crossing, concrete	3,500.00	
4 sluiceways, concrete	4,800.00	
10 bridges	750.00	
Lateral structures for 4,000 acres, estimated at $1 per acre	4,000.00	
	77,070.00	
Engineering and contingencies, 20 per cent	15,414.00	
		92,484.00
Total		158,484.00

MONTANA, HUNTLEY PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Yellowstone.

Townships: 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Railroads: Northern Pacific; Chicago, Burlington & Quincy.

Railroad stations and estimated population January 1, 1913: Huntley, 150; Osborn; Worden, 100; Newton; Pompeys Pillar, 75; Bull Mountain; Ballantine, 100; and Anita, Mont.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of Yellowstone River at Huntley (12,000 square miles), 1908 to 1912: Maximum, 7,391,600; minimum, 5,280,000; mean, 6,214,320.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1913: 28,805 acres.

Area under water-right applications, season 1913: 24,188 acres.

Length of irrigating season: May 1 to September 30—153 days.

Average elevation of irrigable area: 3,000 feet above sea level.

Average annual rainfall on irrigable area: For 7 years, 14.12 inches; for calendar year 1912, 18.17 inches.

Range of temperature on irrigable area: —35° to 100° F.

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Principal products: Alfalfa, oats, barley, potatoes, and sugar beets.

Principal markets: Billings, Mont.; St. Paul and Minneapolis, Minn.; Denver, Colo.; Kansas City, Mo.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: May 21, 1907; March 3, 1909; March 13, 1912; June 23, 1913.

Location of lands opened: Ts. 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Present status of irrigable lands opened: 23,644 acres entered subject to the reclamation act: 1,969 acres open to entry; 3,192 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $30. Additional charge of $4 per acre to Indians.

Annual operation and maintenance charge: $1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.

Construction recommended by board of engineers February 26, 1905.

Construction authorized by Secretary April 18, 1905.

First irrigation by Reclamation Service, season 1908.

Main unit completed in 1908.

Entire project 98 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Huntley project provides for the diversion of water from the south side of the Yellowstone River, about 2 miles above Huntley, Mont., into a main canal which extends down the valley about 27 miles to a point 2 miles east of Bull Mountain. The greater portion of the water is distributed by gravity. Fourteen miles below the head gates a pumping plant is installed, and a small portion of the water is lifted 45 feet into a high-line canal which will feed the proposed high-line equalizing reservoir. The high-line and reservoir-line canals serve about 5,160 acres of land above the main canal in the vicinity of Ballantine, Anita, and Pompeys Pillar. The pumping plant is a reinforced concrete building containing two pumping units, each with a capacity of 28 second-feet and each comprising a turbine water wheel directly connected with a centrifugal pump by means of a vertical shaft. Two hundred and eighty-six net horsepower is developed by a 34-foot drop in the main canal.

The proposed high-line canal reservoir will be located 7 miles below the intake of the high-line canal and will have a storage capacity of 853 acre-feet, created by throwing an earthen dam containing 151,350 cubic yards of material across the mouth of a coulee in the vicinity of Anita, Mont. The water stored in the equalizing reservoir will insure at all times an adequate supply to the reservoir-line canal, which at present is fed direct from the high-line canal by a 34-foot concrete drop. During the present season the main canal is being utilized for irrigation purposes only as far as Lost Boy Creek and the high-line canal as far as the reservoir site. Practically all proposed construction, with the exception of the reservoir was completed at the end of the fiscal year 1913.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

CONSTRUCTION DURING FISCAL YEAR.

Extension of canals.—At the end of the fiscal year construction work on the extension of the project was practically completed, involving earthwork construction of 8.5 miles of extension of the main canal, 5.8 miles of extension of the high-line canal, 9 miles of reservoir-line canal structures, and the lateral system thereunder in the vicinity of Anita, Pompeys Pillar, and Bull Mountain. On July 1, 1912, a severe rainstorm occurred in the form of a cloudburst, which damaged the canals and structures on this extension. They were repaired by Government forces, the work being practically completed at the end of the fiscal year.

Drainage work.—Tile drain lines Nos. 1, 2, 3, 4, and 5, aggregating 3.5 miles in length, were constructed during the fiscal year for the relief of waterlogged areas in the vicinity of Ballantine and Newton. Plans were perfected for the construction of tile lines Nos. 6, 7, 8, 9, and 10, aggregating a total length of 13 miles, and the construction of lines 6, 7, 8, and 9 was advertised and contract awarded. At the end of the fiscal year the contractor was making preparations to start work. Tile line No. 10 will be constructed by Government forces, and preparations were being made to start work the first of the ensuing fiscal year.

OPERATION AND MAINTENANCE.

The operating season of 1912 opened May 10 and closed September 16. Water was delivered under a 7-day rotation method which was later changed to a 4-day rotation. The entire canal system was operated continuously throughout the season with the exception of about 15 days in July, when there was an intermission, due to heavy rains which occurred on July 1 and 2 and which extended over the entire project and made immediate irrigation unnecessary. The storm was accompanied by hail in some localities.

The operating season of 1913 opened May 9 and will close about October 1. Water was delivered under a 4-day rotation providing for a continuous flow in the laterals and the rotation of alternate farm units. The entire canal system, comprising 194 miles of canals and the pumping plant, serving the first unit of the project, was under operation.

Maintenance work consisted of the usual repairs and cleaning of canals. A number of wooden structures were replaced with concrete structures. The spring run-off during 1912 and the heavy rains July 1 and 2 did considerable damage between Pryor Creek Weir and the Northern Pacific Railway tracks, and to prevent further damage earthen embankments were constructed and riprapped from the structure to the bridge.

For " Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Huntley project.

Item.	1909	1910	1911	1912	1913
Acreage for which service was prepared to supply water	28,805	28,805	28,805	28,805	28,805
Acreage irrigated	6,000	8,000	12,000	14,425	[1] 16,000
Number of farms irrigated	300	350	415	480	[1] 525
Miles of canal operated	155	175	175	194	194
Water diverted (acre-feet)			48,788	46,994	[1] 56,000
Water delivered to land (acre-feet)	12,000	15,767	22,550	21,437	[1] 28,000
Per acre of land irrigated (acre-feet)	2.0	2.03	1.88	1.5	[1] 1.75

[1] Estimated.

SETTLEMENT.

The population of the project during the fiscal year 1911 was approximately 1,800; in 1912, 2,000; and in 1913, 2,100. At the end of the fiscal year 1911, 465 farm units had been filed upon, 530 at the end of the fiscal year 1912, and 536 at the end of the fiscal year 1913. The large majority of the settlers are of the permanent type. During the fiscal year 1911, there were 36 relinquishments; in 1912, 27, and in 1913, 16.

PRINCIPAL CROPS.

During the season of 1912 there were 14,425 acres in crops and irrigated. Crop reports were obtained from 13,285 acres and the values thereof estimated at $360,071. The total yield and value of the various crops are shown in the tabulation below. Up to July 1 crops were in excellent condition, but the storm on that date did considerable damage to alfalfa and grain crops. The first cutting of alfalfa, which had been stacked loosely with the idea of topping out with the second cutting, was saturated with rain and a good deal of it spoiled. The grain crops in localities where the hail was heavy were badly damaged, and the sugar-beet crop was damaged to some extent in being set back in growth from a week to 10 days; however, this crop was in excellent condition at the end of the season. The abnormal amount of rain during the fall delayed the harvesting of crops, reduced the yield per acre, increased the cost of hauling the crops to market, and resulted in a material loss to the farmer. Especially was this true with the beet crop. At the end of the fiscal year the crops were in excellent condition and a bumper yield is anticipated. It is estimated that there are 16,000 acres in crops and that the yield per acre will exceed that of the season 1912.

Crop statistics, Huntley project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa, old	3,221	Ton	8,432	$59,024
Blue stem	265	do	247	6,405
Corn	644	Bushels.	4,830	2,414
Grain (oats and flax)	3,339	do	74,525	35,236
Grain hay	525	Ton	415	4,150
Potatoes	118	Bushels.	11,125	5,562
Sugar beets	4,660	Ton	38,680	232,080
Truck	170			5,900
Miscellaneous	343			9,300
Total cropped	13,285			360,071
Other purposes	1,140			
Total irrigated	14,425			

FINANCIAL STATEMENTS.

Assets and liabilities, Huntley project, June 30, 1913.

ASSETS.

Accounts receivable:		
Freight refunds	$14.38	
Water-right building charge	61,787.74	
Water-right operation and maintenance charge	16,375.11	
		$78,177.23

Inventories:			
Equipment in use—			
Animals	$1,780.00		
Mechanical and other	17,210.71		
		$18,990.71	
Materials, supplies, etc., in storehouse		11,461.79	
Cement		693.89	
Lumber		1,321.01	
Forage		890.48	
Fuel		108.95	
Unadjusted transfer between projects		569.36	
Undistributed cost, freight, and handling on inventory property		33.27	
			$34,069.46
Improvements to land:			
Gross cost		967,334.99	
Less credits for incidental operations—			
Rentals of cottages	315.00		
Rentals of grazing lands	1,095.69		
Rentals of telephones	376.98		
Revenues, miscellaneous	212.00		
Adjustments—			
Contractor's freight refunds	7,494.07		
		9,493.74	
			957,841.25
Deferred operation and maintenance revenues			177,597.20
Total assets			1,247,685.14

LIABILITIES.

Accounts payable:			
Labor		6,431.44	
Purchases		1,916.90	
Freight and express		2,953.79	
Passenger fares		390.48	
			11,692.61
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued		266,785.63	
Building advance collections		3,165.54	
Building collections forfeited		3,289.68	
			273,240.85
Unadjusted credits, net earnings of Government animals			407.45
Net investment:			
Disbursement vouchers	1,353,357.84		
Transfers received	55,173.51		
		1,408,531.35	
Less—			
Collection vouchers	292,501.07		
Transfers issued	153,686.05		
		446,187.12	
			962,344.23
Total liabilities			1,247,685.14

Feature costs, Huntley project, to June 30, 1913.

Main canal and high-line canal:		
Excavation	$381,077.79	
Structures	87,059.37	
Railroad bridges and culverts	5,467.08	
		$473,604.24
Distributing system:		
Earthwork and structures	237,866.64	
Pumping plant, 34-foot drop in main canal	71,522.30	
Pryor Creek improvement	19,297.79	
		328,686.73

Canal extensions:		
Surveys	$14,387.17	
Camps, construction	2,059.20	
Contract No. 410 (earthwork)	38,639.72	
Contract No. 413 (structures)	46,922.71	
Repairs to earthwork (Government force account)	6,315.39	
Repairs to structures (Government force account)	16,894.14	
Lost Boy Creek structures (Government force account)	5,830.88	
		$131,049.21
Real estate	1,029.72	
Telephone line, construction	9,041.01	
Buildings and grounds, construction	17,774.89	
Supplemental construction	6,149.19	
		33,994.81
Total building cost		967,334.99
Operation and maintenance:		
Main canal	46,471.52	
Lateral system	134,403.45	
Pumping plant	10,479.87	
Experiment stations	2,271.47	
Telephone system	500.00	
Buildings and grounds	3,117.18	
Dikes and levees	1,608.78	
Drainage	33,030.10	
Irregular subdivision surveys	2,928.36	
Undistributed expense	8,129.31	
Total operation and maintenance cost		242,940.04
Total building and operation and maintenance cost		1,210,275.03

Operating revenues and expenses, Huntley project, to June 30, 1913.

EXPENSES.

Carriage:		
(*a*) Operation	$9,487.92	
(*b*) Maintenance	36,983.60	
		$46,471.52
Distribution:		
(*a*) Operation	18,815.97	
(*b*) Maintenance	126,067.35	
		144,883.32
Drainage:		
(*a*) Operation	31,585.83	
(*b*) Maintenance	1,444.27	
		33,030.10
Undistributed expenses		18,736.10
		243,121.04

REVENUES.

Operation and maintenance, accruals	62,056.81
Operation and maintenance, forfeitures	851.23
Rental of lands and buildings	2,567.80
Rental of irrigation water	48.00
Deferred operation and maintenance revenues	177,597.20
	243,121.04

Estimated cost of contemplated works, Huntley project.

Construction of Anita Reservoir	$10,000.00
Construction of tile line drains	175,000.00
	185,000.00

MONTANA, MILK RIVER PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Teton, Hill, Blaine, and Valley.

Townships: 34 to 37 N., R. 14 W.; 34 N., R. 15 W.; 37 N., Rs. 11 to 13 W.; 27 to 33 N., Rs. 17 to 42 E., Montana meridian.

Railroads: Great Northern and Canadian Pacific.

Railroad stations and estimated population January 1, 1913: Browning; Havre, 4,500; Chinook, 1,000; Harlem, 450; Savoy, 40; Coburg, 30; Dodson, 200; Wagner, 75; Malta, 650; Saco, 400; Hinsdale, 250; Glasgow, 1,500; and Nashua, Montana, 150; Cardston and Woolford, Canada.

WATER SUPPLY.

Source of water supply: St. Mary Lakes, Swift Current Creek, and Milk River.

Area of drainage basin: St. Mary Lakes and Swift Current Creek, 298 square miles; Milk River at Havre, 5,050 square miles; Milk River at Malta, 10,700 square miles; Milk River at Hinsdale, 17,300 square miles.

Annual run-off in acre-feet of St. Mary River (including Swift Current Creek): At Babb (298 square miles), 1902–1912—maximum, 830,000; minimum, 469,000; mean, 627,000. At International Line (452 square miles), 1903–1912—maximum, 1,107,300; minimum, 514,100; mean, 744,800. Of Milk River: At Havre (5,050 square miles), 1898–1912—maximum, 426,000; minimum, 17,100; mean, 227,140. At Malta (14,000 square miles), 1903–1912—maximum, 675,000; minimum, 51,000; mean, 380,240. At Hinsdale (17,300 square miles), 1909–1912—maximum, 1,229,000; minimum, 228,000; mean, 594,600.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1913, 12,800 acres.

Area under rental contracts, season of 1913, 1,170 acres.

Length of irrigating season: From March 1 to September 15—185 days.

Average elevation of St. Mary storage, 4,500 feet above sea level.

Average elevation of irrigable area, 2,200 feet above sea level.

Average annual rainfall on St. Mary storage: About 24 inches (Teton County, including the snow equivalent). Rainfall at Babb, Mont., 1912, 22.7 inches.

Average annual rainfall on irrigable area: For 30 years at Havre, 13.58 inches; for 1912 at Havre, 12.26 inches; for 7 years at Malta, 13.76 inches; for 1912 at Malta, 17.56 inches.

Range of temperature on irrigable area, —50° to 103° F.

Character of soil of irrigable area: Sandy loam and gumbo.

Principal products: Alfalfa, hay, grain, and vegetables.

Principal markets: Minneapolis and St. Paul, Minn.; local.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. Two thousand and seventy-four acres were irrigated under rental contracts in 1911, 352 acres in 1912, and 802 acres in 1913 to June 30.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun by the Reclamation Service in 1902.

Construction recommended by director March 7, 1903.

Construction conditionally authorized by Secretary March 14, 1903.

Construction of St. Mary Storage unit recommended by board of engineers September 19, 1904.

Construction of St. Mary storage unit authorized by Secretary March 25, 1905.

Construction begun July 27, 1906.

Construction of Dodson South Canal begun July, 1908.

Dodson Diversion Dam completed in January, 1910.

Treaty with Great Britain relating to distribution between Canada and the United States of the waters of St. Mary and Milk Rivers signed January 11, 1909, and proclaimed May 13, 1910.

Board of Engineers decided to change the location of upper end of St. Mary Canal to the west side of St. Mary River, August 30, 1911.

Vested water-right contract executed May 1, 1912.

Recommendations covering construction of the project approved by Secretary June 13, 1912.

Construction of Dodson North Canal begun June 28, 1912.

Construction resumed on Dodson South Canal March 6, 1913.

Construction begun on Vandalia South Canal April, 1913.

Construction begun on Vandalia diversion April, 1913.

Milk River unit 20.4 per cent completed June 30, 1913.

St. Mary Storage unit 17.1 per cent completed June 30, 1913.

Entire project 19.3 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Milk River project provides for the storage of water in St. Mary Lakes by means of a dam at the outlet of Lower St. Mary Lake and its diversion through a canal 28.8 miles long, heading 1 mile below the reservoir and discharging into the North Fork of Milk River, thence flowing through Canada for 100 miles or more and returning to the United States; the storage of water in Nelson Reservoir south of Milk River and 14 miles northeast of Malta; the discharge of stored water into Milk River as required; the diversion of water from Milk River by a dam near Chinook into two canals, one on each side of the river, for the irrigation of lands near Chinook and Harlem, comprising the Chinook division; the diversion of water from Milk River by a dam near Dodson into two canals, the north side canal irrigating lands near Dodson, Wagner, and Malta, and the south side canal conveying water to Nelson Reservoir and irrigating lands near Wagner, Malta, Bowdoin, and Ashfield; the irrigation of lands on both sides of Milk River in the vicinity of Saco and Hinsdale from the stored waters of Nelson Reservoir, comprising the Malta division; and in the Glasgow division the diversion of water at Vandalia Dam into a canal on the south side of Milk River for the irrigation of lands near Tampico, Glasgow, and Nashua. In case the normal flow of Milk River at Vandalia Dam is not sufficient for the irrigation of lands in the Glasgow division, the stored waters in Nelson Reservoir will be returned to Milk River and diverted again at Vandalia Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The Dodson diversion dam to the height of the fixed crest; headworks for Dodson North and South Canals (10 miles of Dodson South Canal with a capacity of 900 second-feet, including Point of Rocks equalizing reservoir, and the lateral system to cover about 7,800 acres of land above Malta; the remaining 34 miles of Dodson South Canal is under construction); 10 miles of Dodson North Canal, including laterals and structures supplying water to about 5,000 acres below Dodson; 3.2 miles of St. Mary diversion canal; construction work is in progress on the Dodson North and South Canals and the Vandalia Canal and diversion works; and for the St. Mary storage on the St. Mary diversion canal. The principal features remaining to be constructed are the St. Mary storage works, 25.6 miles of the St. Mary Canal, Nelson Reservoir, Chinook and Vandalia diversion dams, and canals and structures in the Chinook, Malta, and Glasgow divisions.

CONSTRUCTION DURING FISCAL YEAR.

MILK RIVER PROJECT.

On June 25, 1913, construction was started under contract on the first unit of the Dodson North Canal, which was practically completed during the calendar year 1912, to cover about 5,000 acres, the work including 10 miles of main canal, all laterals, the main canal

headworks, and all other structures. Contract work was begun in August on the extension of the Peoples Creek Dike and construction proceeded until stopped by frost, at which time 5,565 feet of dike had been placed, 3,400 feet remaining to be built. With the opening of the season of 1913 work was begun under contracts covering a 10-mile extension of Dodson North Canal, the enlargement and extension of 34 miles of the Dodson South Canal from Point of Rocks to Nelson Reservoir, and the Vandalia South Canal 46 miles long. On these canal contracts there had been completed on June 30, 1913, about 25 per cent of the Dodson North Canal, 50 per cent of the Dodson South Canal, and 38 per cent of the Vandalia South Canal.

Work has been in progress and is now nearing completion on the plans and specifications for the structures and laterals under the Vandalia Canal covering about 25,000 acres and under the extension of the Dodson South Canal covering about 3,800 acres. The plans and specifications for the completion of the Dodson North Canal and all remaining laterals and structures covering about 6,000 acres north of Malta were completed during the fiscal year, and bids are to be opened on August 6, 1913. In April, 1913, a construction camp was established at the Vandalia dam site, and earthwork is now in progress there with a small Government force. Permanent quarters have been provided for the force at the project headquarters at Malta by the construction during the fiscal year of a warehouse, barn, bunkhouse, and substantial office building with concrete vault. These buildings were completed in June, 1913, at which time the office force was established in its new and permanent quarters.

ST. MARY STORAGE UNIT.

The principal work consisted of the construction of a camp at Browning Station on the Great Northern Railroad and the enlargement of the camp at Browning town; the construction of a temporary camp at Kennedy Creek crossing and of a permanent camp at St. Mary River crossing; repairs to the headquarters camp near Babb and the construction of a mess house and repairs to the camp at the sawmill at the foot of lower St. Mary Lake; the construction of 28 miles of highway between Browning Station and St. Mary River crossing, 39.6 miles of telephone line between Browning Station and headquarters camp near Babb; 24.4 miles of telephone line from Seville to Browning town and 3.2 miles of the St. Mary Canal between Kennedy Creek and the St. Mary River crossing; the cutting of 950,000 feet b. m. of logs, the skidding of 550,000 feet b. m., and the rafting to the mill and sawing of 150,000 feet b. m. All of the above work was done by Government forces. In addition, the pipe material for the St. Mary crossing pipe line was delivered on the ground and 1,439 feet were riveted into sections 32 feet long.

On May 28, 1912, the Board of Engineers approved the location and general features of the St. Mary Canal from the headworks to Spider Lake and recommended the construction by Government forces of that part of the canal between Kennedy Creek and the St. Mary River crossing, including the Kennedy Creek crossing, the Powell Creek crossing, and the Kennedy Creek dikes, and the construction by contract of that part of the St. Mary crossing pipe line lying

west of the river, with the view of constructing a temporary hydroelectric power plant at this point. Three and one-fifth miles of this section of the canal were excavated by Government forces with one long-boom steam shovel and one drag-line excavator operated 16 hours per day. The shovel was started in operation August 28 and worked until December 31, 1912; resumed operation May 5, 1913, and was stopped and moved back south of Kennedy Creek May 24. The drag-line excavator was started October 12 and worked until December 19, 1912; resumed operation May 12, 1913, and was continued in operation throughout the balance of the fiscal year. During this period 136,227 cubic yards of earth were excavated. The excavation of the trench for the St. Mary River crossing pipe line was also done by Government forces.

During the fiscal year the relocation of the St. Mary Canal east of Spider Lake was completed, and the right of way surveyed and mapped. The boundary line of the Lower St. Mary Lake Reservoir reservation was established and permanently marked. Topographic surveys of the Sherburne Lakes Reservoir and the McDermott Lakes were made. Test pits and borings were made, with good results, at the Sherburne Lakes Reservoir dam site to determine the suitability of the site for an 85-foot earth dam. One hundred and ten acres of the flowage lands around the lower end of Lower St. Mary Lake were broken and seeded to timothy and redtop, with oats as a nurse crop, to insure forage for Government animals.

OPERATION AND MAINTENANCE.

The season of 1912 opened with an abundance of moisture in the ground, and heavy rains in the late spring made the river bottom land too wet for proper tillage for good crops. An unusual amount of rain which fell during the growing season reduced the demand for water, which was supplied to only 352 acres. The acreage was, however, so widely scattered over the entire irrigable area as to make necessary the operation of the greater part of the system. Frequent light rains during the spring of 1913 have affected the demand for water so that only 23 applications have been received and only 802 acres irrigated prior to June 30. The indications are, however, that an increasing amount of water will be needed during the remainder of the season. Maintenance work consisted chiefly of protection work at the headworks of the Dodson North Canal and the placing of a few small structures in that system.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Milk River project.

Item.	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	7,800	7,800	12,800
Acreage irrigated	2,074	352	802
Number of farms irrigated	29	9	21
Miles of canal operated	30	30	50
Water diverted (acre-feet)	11,160	2,885	1,452
Water delivered to land (acre-feet)	2,853	293	585.5
Per acre of land irrigated (acre-feet)	1.28	0.82	0.72

SETTLEMENT.

As no public notice announcing the opening of the project has been issued, no progress has been made in settlement, although a few transfers have been made of deeded lands. Water is being delivered to patented and homestead lands on a rental basis.

PRINCIPAL CROPS.

The principal crops for 1913 are wheat, oats, barley, flax, and alfalfa. The following table shows the acreage, yield, and value of the principal crops raised in 1912:

Crop statistics, Milk River project, calendar year 1912.

Crops.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	14	Ton	43	$344
Barley	140	Bushel	3,426	1,028
Blue-joint hay	290	Ton	236	2,124
Flax	675	Bushel	10,900	16,350
Garden	12			360
Oats	892	Bushel	33,300	6,660
Potatoes	23	do	3,039	912
Spring wheat	854	do	18,981	13,287
Winter wheat	120	do	3,200	2,240
Total cropped	3,020			43,305

NOTE.—This tabulation covers all lands in crop under first unit, Dodson South Canal, whether irrigated or not.

FINANCIAL STATEMENTS.

Assets and liabilities, Milk River project, June 30, 1913.

ASSETS.

Cash in special financial agent's possession awaiting remittance			$133.69
Accounts receivable:			
Freight refunds		$3,840.74	
Water rentals		1,347.00	
			5,187.74
Inventories:			
Mercantile stores		3,754.04	
Equipment in use—			
Animals	$3,845.75		
Mechanical and other	21,597.14		
		25,442.89	
Materials, supplies, etc., in storehouse		25,876.60	
Products of local operation		583.98	
Undistributed cost, freight and handling		[1] 289.17	
Transfer adjustments		2,014.79	
			57,383.13
Improvement to land:			
Gross cost		1,136,821.40	
Less credits from incidental operations—			
Rental of cottages	164.23		
Irrigation water	4,721.97		
Miscellaneous revenues	946.00		
Miscellaneous	440.96		
Loss, mess operations	[1] 3,579.63		
Profits, mercantile stores	1,105.87		
Profits of hospital	348.74		

[1] Deduct.

Improvement to land—Continued.			
Adjustments—			
Contractors' freight refunds	$4,072.80		
Forfeitures by defaulting bidders	910.00		
		$9,130.94	
			$1,127,690.46
Total assets			1,190,395.02

LIABILITIES.

Account payable:			
Labor		8,245.87	
Purchases		5,679.54	
Contract estimates		81,130.27	
Contract holdbacks		21,716.46	
Freight and express		4,446.19	
Passenger fares		421.16	
Land agreements		4,811.22	
Coupons		23.00	
			126,473.71
Reserves for depreciation on plant and equipment			2,956.23
Unadjusted credits, net earnings of Government animals			1,336.62
Net investment:			
Disbursement vouchers	1,014,786.22		
Transfers received	75,160.58		
		1,089,946.80	
Less:			
Collection vouchers	9,876.86		
Transfers issued	20,441,48		
		30,318.34	
			1,059,628.46
Total liabilities			1,190,395.02

Assets and liabilities, Milk River project (St. Mary storage unit), June 30, 1913.

ASSETS.

Cash in possession of special financial agent awaiting remittance			$163.44
Accounts receivable, miscellaneous			2,467.43
Inventories:			
Mercantile stores		$2,107.32	
Equipment in use—			
Animals	$9,010.97		
Mechanical and other	36,260.70		
		45,271.67	
Materials, supplies, etc., in storehouse		45,760.93	
Cement and sacks		5,562.95	
Steel		4,320.00	
Lumber		1,755.85	
Explosives		257.19	
Forage		6,860.33	
Fuel		6,256.24	
Products, local operations		179.64	
Goods in transit		1,886.96	
Unadjusted transfers between project		6,351.98	
Undistributed cost (freight and handling on inventory property)		689.95	
			127,261.01

[1] Deduct.

Improvements to lands:			
Gross cost		$463,298.61	
Less credits from incidental operations:			
Rentals of cottages	$1,370.48		
Rental of telephones	366.84		
Miscellaneous revenues	8.50		
Loss on mess operations	[1] 2,797.70		
Profits on mercantile stores operations	1,708.32		
Miscellaneous profits	17.83		
		674.27	
			$462,624.34
Total assets			592,516.22

LIABILITIES.

Accounts payable:			
Labor		5,969.19	
Purchases		9,278.01	
Contract holdbacks		3,020.04	
Freight and express		7,302.75	
Passenger fares		170.25	
			25,740.24
Reserves for depreciation on plant and equipment			21.04
Unadjusted credits, net loss on services Government animals			[1] 4,693.49
Net investment:			
Disbursement vouchers	521,577.06		
Transfers received	87,778.19		
		609,355.25	
Less:			
Collection vouchers	8,925.32		
Transfers issued	28,981.50		
		37,906.82	
			571,448.43
Total liabilities			592,516.22

Feature costs, Milk River project, to June 30, 1918.

Diversion works:		
Dodson Dam	$149,553.48	
South headgates	14,835.62	
Dike headworks	13,158.94	
Vandalia Dam	15,587.35	
		$193,135.39
Canal system:		
Bowdoin Main Canal	2,404.59	
Bowdoin Main Canal, distributing system	2,748.88	
Dodson North Main Canal	103,849.00	
Dodson North Main Canal, distributing system	43,839.30	
Dodson South Main Canal	401,390.97	
Dodson South Main Canal, distributing system	82,641.57	
Vandalia South Main Canal	93,816.58	
Vandalia South Main Canal, distributing system	7,796.26	
		738,487.15
Real estate (rights and property), lands purchased:		
Malta office site	561.09	
Dodson North Main Canal	1,975.03	
Dodson South Main Canal	6,625.77	
Vandalia South Main Canal	685.78	
Dodson diversion	14,895.97	
Vandalia diversion	22,259.52	
Vandalia town sites	19.92	
		47,023.08

[1] Deduct.

Buildings:		
Dodson unit	$8,081.46	
Malta office	13,128.53	
Vandalia diversion	4,243.19	
		$25,453.18
Operation and maintenance during construction		35,646.31
Examination of unit:		
Hydrography	$24,168.90	
Surveys	51,780.48	
Water appropriation investigation	17,056.39	
		93,005.77
Inventory of cost ledger supplies		4,070.52
Total building and operation and maintenance cost of unit (during construction)		1,136,821.40

ST. MARY STORAGE UNIT.

Diversion system:		
Dam	5,406.47	
Main Canal	201,818.01	
		207,224.48
Buildings		56,504.39
Real estate (rights and property), lands purchased		14,253.75
Roads and highways:		
Brow[illegible]ng–St. Mary	34,037.66	
Sawmill, canal	642.20	
Cardston	4,466.81	
		39,146.67
Telephone line, construction		8,070.04
Coal mine, prospecting		2,764.97
Waterworks, construction		1,479.02
Examination of unit:		
Hydrography	6,516.59	
Surveys (investigations)	34,606.85	
Topography	1,702.57	
		42,826.01
Administration of unit, general expense		88,960.39
Cost ledger inventories		2,068.89
Total cost of unit		463,298.61
Total building and operation and maintenance cost of project (during construction)		1,600,120.01

Estimated cost of contemplated works, Milk River project.

Preliminary examination and surveys	$98,000.00
Lands and rights of way	55,000.00
Diversion works	600,000.00
Canal system	1,500,000.00
Buildings	28,000.00
Reservoirs	5,000.00
Operation and maintenance during construction	50,000.00
Total	2,336,000.00

Estimated cost of contemplated works, St. Mary storage.

Canal system	$466,514.48
Roads, construction	54,146.67
Telephones, construction and maintenance	10,070.04
Surveys and investigations	63,640.51
General expense	108,300.69
Buildings	58,504.39
Material on hand (E. W. O. 120)	6,500.00
Cost ledger inventories	2,068.89
Total	769,745.67

MONTANA, SUN RIVER PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Teton, Lewis and Clark, Choteau, Cascade.
Townships: 20 to 25 N., Rs. 3 E. to 8 W., Montana meridian.
Railroads: Great Northern. Chicago, Milwaukee & St. Paul.
Railroad stations and estimated population, January 1, 1913; Vaughn, 100; Power, 75; Dutton, 125; Collins, 100; Largent; Fort Shaw, 75; Simms, 150; Riebling; Gilman, 300; and Choteau, 1,000.

WATER SUPPLY.

Source of water supply: Sun River and tributaries, Deep Creek, Bowl Creek, and Basin Creek.
Area of drainage basins: Sun River, 1,070 square miles; Deep Creek, 260 square miles; Bowl Creek, 9 square miles; Basin Creek, 15 square miles.
Annual run-off in acre-feet: North Fork of Sun River, near Augusta, 1905–1912, maximum, 805,000; minimum, 378,000; mean, 640,000. Willow Creek, near Augusta, 1906–1912, maximum, 35,300; minimum, 7,900; mean, 21,000. Sun River, at Sun River, 1906–1912, maximum, 1,140,000; minimum, 390,000; mean, 804,000. South Fork of Sun River, near Augusta, 1905–1912, maximum, 147,000; minimum, 28,000; mean, 75,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 16,346 acres.
Area under water-right applications, season of 1913: 11,073 acres.
Length of irrigating season: From May 15 to October 1—138 days.
Average elevation of irrigable area: 3,700 feet above sea level.
Average annual rainfall on irrigable area for 25 years: 12 inches; 1912, 9.84 inches.
Range of temperature on irrigable area: —40° to 100° F.
Character of soil of irrigable area: Sandy loam, clay, abode, and alluvium.
Principal products: Hay, grain, and vegetables.
Principal markets: Great Falls, Helena, and Butte, Mont.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 26, 1908; November 19, 1910; March 28, 1911; March 2, 1912.
Location of lands opened: Ts. 20 and 21 N., Rs. 1 to 3 W., Montana meridian.
Present status of irrigable lands opened: 10,873 acres entered, subject to the reclamation act; 2,405 acres open to entry; 281 acres of State lands; 1,896 acres in private ownership, which have not applied for water; 400 acres in private ownership which have applied for water.
Limit of area of farm units: 160 acres.
Duty of water: 2 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $30 and $36.
Annual operation and maintenance charge: $1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1905.
Construction recommended by board of engineers, February 13, 1906.
Construction authorized by Secretary February 26, 1906.
Fort Shaw Main Canal completed July, 1908.
First irrigation by Reclamation Service, season of 1909.
Fort Shaw unit completed December, 1909.
Willow Creek Dam completed, present development, November 7, 1911.
Entire project 10 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Sun River project provides for the storage of water in Sun River Storage Reservoir on the North Fork of Sun River; in the Willow Creek Reservoir on Willow Creek; in Pishkun Reservoir, north of Sun River; in the Muddy Creek Reservoir, on Muddy Creek, and in Benton Lake Reservoir, 8 miles north of Great Falls, Mont.; the diversion of water from Bowl and Basin Creeks, tributaries of Flathead River, across the Continental Divide to Sun River drainage; the diversion of water from the North Fork of Sun River through supply canals for the Willow Creek and Pishkun Reservoirs; the diversion of flood waters from Deep Creek into Benton Lake Reservoir; the diversion of water from Sun River, supplemented by stored waters released from Sun River Storage and Willow Creek Reservoirs, into a canal system watering lands mainly in the abandoned Fort Shaw Military Reservation; the diversion of water from Pishkun Reservoir into Sun River Slope Canal, supplying water for lands in the Sun River Valley; the diversion of water from Deep Creek, supplemented by stored water released from Sun River Storage and Pishkun Reservoirs; and for the lower lands of the system by stored water released from Benton Lake Reservoir into a canal system supplying water to the lands in the Sun River and Teton River Valleys. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The Fort Shaw unit and the Willow Creek Dam (first development) of the project are completed. Final location surveys have been made for the main canal supplying Pishkun Reservoir and for the main canals supplying Sun River slope and Teton River slope. Preliminary surveys have been made for the main canals of the remainder of the project. Location of distribution system for Greenfields unit is now in progress. Diamond-drill borings have been made at the site of the proposed Sun River diversion and Sun River storage dams. Topographic surveys have been made of the irrigable lands on the Teton River and Sun River slopes; for Sun River Storage, Pishkun, Willow Creek, Muddy Creek, and Benton Lake Reservoirs. Construction camp has been constructed at Sun River diversion and the necessary equipment assembled to begin construction of Sun River diversion and the first mile of Pishkun Reservoir supply canal.

CONSTRUCTION DURING FISCAL YEAR.

Camp construction, Sun River diversion.—Camp buildings, including a water and sewerage system to accommodate 250 men, were constructed, and machinery installed to begin construction of Sun River diversion and the first mile of Pishkun Reservoir supply canal.

Highway construction.—A highway was constructed from Gilman, the present terminus of the Sun River branch of the Great Northern Railway, to Sun River diversion, a distance of 20 miles. The highway will be used in hauling supplies, materials, and equipment for construction of Sun River diversion and Pishkun Reservoir supply canal.

OPERATION AND MAINTENANCE.

On the Fort Shaw unit, during the season of 1912, the entire canal system, including 121 miles of canals and laterals, was in operation, irrigating 180 farm units, aggregating 6,824 acres. Thirteen thousand acre-feet of water in Willow Creek Reservoir were available, but were not used, as the supply from the river was sufficient.

The irrigating season began June 1 and closed September 5. Twenty thousand three hundred and ninety-two acre-feet of water were diverted, of which 11,688 acre-feet were delivered to the land, the balance being lost by seepage and evaporation or wasted. A small maintenance force was employed at various times during the

season in riprapping, building checks and turnouts, and cleaning ditches. The season of 1913 opened on May 19.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Sun River project.

Item.	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	16,000	16,346	16,346	16,346
Acres irrigated	4,194	6,892	6,824	5,000
Number of farms irrigated	120	171	180	134
Miles of canals operated	105	121	121	121
Water stored (acre-feet) maximum	.....	2,500	13,000	13,000
Water diverted (acre-feet)	30,499	24,192	20,392	7,150
Water delivered to land (acre-feet)	9,707	11,380	11,688	3,993
Per acre of land irrigated (acre-feet)	2.3	1.65	1.71	0.71

SETTLEMENT.

During the past year, on the Fort Shaw unit, 9 new filings were made; 4 entrymen relinquished their land and assigned their water-right applications; and 5 entries were canceled for noncompliance with the homestead law. The population and number of farms on the Fort Shaw unit during the past three years is as follows:

Year.	Number of farms.	Population on the farms.	Population in the towns.
1910	178	850	.....
1911	194	735	125
1912	198	710	323

NOTE.—Population 1910 includes population both on farms and in the towns.

During 1912 a number of the settlers who had offered final proof on their entries rented their land and moved to nearby towns. These are in general mechanics who did not themselves expect to farm, but to follow their trades. The population now on the farms is apparently permanent. During the past three years the following numbers of relinquishments were made, and the water-right applications assigned: 1910, 4; 1911, 13; 1912, 4.

Crop statistics, Sun River project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	1,266.5	Ton	2,130.6	$12,784.60
Barley	223.5	Bushel	3,113.5	1,744.56
Beets	4.0	Ton	45.75	229.75
Flax	264.5	Bushel	2,417.5	2,780.12
Garden	68.5	.....	.....	6,850.00
Hay, wild grain	301.5	Ton	129	516.00
Millet	3.0	Bushel	12	18.00
Oats	2,555.5	...do	7,543.7	30,175.80
Potatoes	193.75	...do	21,077.94	7,588.00
Rye	10	...do	84	50.40
Wheat	1,933.5	...do	32,854	21,355.10
Total	6,824.25	.....	.....	84,092.33

ORDER DATED JULY 13, 1912.

Whereas, it has been reported to the department that many of the water users under the Fort Shaw unit of the Sun River project, Montana, are unable to pay the operation and maintenance charge due March 1, 1912, amounting to $1 per acre of irrigable land, and that the postponement for the liability for such charge until December 1, 1912, with an increase of 10 cents in the amount of such charge will enable the water users to obtain water and make a crop in the season of 1912:

Now, therefore, by virtue of the authority contained in the reclamation act approved June 17, 1902 (32 Stat., 388), and by acts supplementary thereto and amendatory thereof, it is hereby ordered:

1. That any water user in said project, who has filed water-right application subject to the terms of the public notices heretofore issued, and who is financially unable to pay the portion for operation and maintenance of the installment due March 1, 1912, amounting to $1 per acre of irrigable land, may receive water in the irrigation season of 1912, without prior payment thereof, subject to the following conditions:

2. Every such water user shall fully pay the unpaid balance, if any, of operation and maintenance charges for 1911 and prior years before any water is furnished for his land in 1912.

3. Every such water user desiring such extension of time shall on or before August 15, 1912, make written application therefor to the project engineer, accompanied by his affidavit that he is unable to make such payment at this time and agreeing to make the said payment not later than December 1, 1912. For all persons to whom such extension is granted the charge for operation and maintenance for 1912 shall be $1.10 instead of $1 per acre of irrigable land.

SAMUEL ADAMS,
First Assistant Secretary.

FINANCIAL STATEMENTS.

Assets and liabilities, Sun River project, June 30, 1913.

ASSETS.

Cash in special financial agent's possession awaiting remittance			$150.61
Accounts receivable:			
Miscellaneous		$106.97	
Water-right building charge		56,930.97	
Water-right operation and maintenance charge		13,345.46	
			70,383.40
Inventories:			
Mercantile stores		1,832.52	
Equipment in use—			
Animals	$7,773.51		
Mechanical and other	45,752.92		
		53,526.43	
Materials, supplies, etc., in storehouse		45,852.80	
Cement		176.50	
Lumber		18,236.06	
Explosives		9,044.65	
Forage		471.33	
Fuel		8,243.93	

Inventories—Continued.			
Products of local operations		$840.17	
Unadjusted transfer between projects		2,797.90	
Undistributed cost (freight and handling) on inventory property		2,088.84	
			$143,111.13
Improvements to land:			
Gross cost		987,210.94	
Less credits from incidental operations—			
Rentals of cottages	$2,932.90		
Rentals, grazing lands	4,463.91		
Telephone rentals	117.95		
Revenues, miscellaneous	9,446.38		
Profits on mess operations	5,799.63		
Profits on mercantile stores	1,042.43		
Profits on hospital	708.94		
(*a*) Adjustments, contractor's freight refunds	830.42		
		25,342.56	
			961,868.38
Deferred operation and maintenance revenues			21,884.96
Total assets			1,197,398.48

LIABILITIES.

Accounts payable:			
Labor		8,826.83	
Purchases		26,807.63	
Contract estimates		4,728.70	
Freight and express		7,348.11	
Passenger fares		745.49	
Coupons		11.90	
Miscellaneous		251.84	
			48,720.50
Reserves:			
For amortization of original cost by repayment:			
Building charges accrued	$140,701.95		
Building advance collections	229.20		
Building collections forfeited	842.13		
		141,773.28	
For depreciation on plant and equipment		[1] 6,558.91	
			135,214.37
Unadjusted credits, net earnings of Government animals			390.74
Net investment:			
Disbursement vouchers	1,075,930.49		
Transfers received	85,074.04		
		1,161,004.53	
Less—			
Collection vouchers	129,384.12		
Transfers issued	18,547.54		
		147,931.66	
			1,013,072.87
Total liabilities			1,197,398.48

Feature costs Sun River project, to June 30, 1913.

MAIN PROJECT.

Storage works:			
Sun River storage		$23,280.51	
Pishkun reservoir		1,491.13	
Willow Creek reservoir		239,317.53	
Benton Lake reservoir		883.15	
			$264,972.32
Diversion works: Sun River diversion dam			27,796.51

[1] Deduct.

Canal system:		
Continental Divide Canal	$1,749.19	
Pishkun Reservoir Supply Canal	18,189.01	
Willow Creek Supply Canal	715.18	
Smith Creek Supply Canal	356.23	
Teton River slope	10,024.11	
Sun River Slope Canal (Spring Valley division)	13,355.02	
Sun River Slope Canal (Greenfields division)	16,941.14	
Deep Creek feeder canal to Pishkun reservoir	406.54	
Sunnyside Canal	257.31	
		$61,993.73
Telephone system		10,894.89
Transmission line		7,342.15
Real estate		23,790.84
Irrigable lands (farm unit subdivision)		4,087.20
Buildings		57,016 57
Roads		25,035.68
Plant accounts		6,573.09
Examination of project as a whole		95,299.53
Inventory of cost ledger supplies		1,581.08
Total building cost, main project		586,383.59

FORT SHAW UNIT.

For Shaw canals:			
Main canals—For Shaw canal, excavation		111,215.74	
Main laterals—			
Lateral A, excavation	53,601.22		
Lateral C, excavation	39,140.02		
Lateral D, excavation	35,060.62		
		127,801.86	
Structure—			
Headworks	17,610.01		
Spillway (station 32, main canal)	1,031.52		
Simms Creek siphon	36,752.14		
Simms wasteway	1,429.44		
Drop (station 293, main canal)	3,863.83		
Drop A	3,740.39		
Drop C	5,660.28		
Lateral A turnout	1,679.76		
Culverts, flumes, turnouts, bridges, etc	90,042.38		
		161,809.75	
Total building cost, Fort Shaw unit			400,827.35

OPERATION AND MAINTENANCE FORT SHAW UNIT.

For Shaw main canal	10,422.27	
For Shaw lateral system	26,396.35	
Fort Shaw unit, structures	1,795.36	
Buildings	286.90	
Telephone	2,108.67	
Administration	4,706.12	
Publicity and settlement	5,710.16	
Instruction and demonstration	1,998 79	
Seepage investigation	2,954.71	
		56,379.33
Total building and operation and maintenance cost, entire project		1,043,590.27

Operating revenues and expenses Sun River project to June 30, 1913.

EXPENSES.

Distribution:		
(*a*) Operation	$10,979.84	
(*b*) Maintenance	30,029.71	
		$41,009.55
Drainage operation		2,954.71
Undistributed expenses		12,415.07
		56,379.33

REVENUES.

Operation and maintenance accruals	34,010.26
Operations and forfeitures	140.36
Rental of irrigation water	343.75
Deferred operation and maintenance revenues	21,884.96
	56,379.33

Estimated cost of contemplated works, Sun River project.

Storage works:	
Pishkun Reservoir	$76,000.00
Willow Creek Reservoir	2,700.00
Diversion works:	
Sun River Diversion	75,000.00
Canal system:	
Pishkun Reservoir Supply Canal	210,000.00
Sun River Slope Canal, Spring Valley Division	175,000 00
Sun River Slope Canal, Greenfields Division	90,000.00
Telephone system	3,500.00
Transmission line	42,000.00
Irrigable lands (farm-unit subdivision)	5,000.00
Buildings	15,000.00
Roads and plant	5,000.00
Operation and maintenance	10,000.00
Operating and maintaining canal system of Fort Shaw unit	10,000.00
Constructing drains, Fort Shaw unit	32,500.00
Total estimated cost for year	751,700.00

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Dawson, Mont.; McKenzie, N. Dak.

Townships: 18 to 26 N., Rs. 56 to 60 E., Montana meridian; 150 to 152 N., Rs. 104 W., fifth principal meridian.

Railroads: Northern Pacific, Great Northern, and Missouri River Railways.

Railroad stations and estimated population January 1, 1913: Intake, 75; Burns, 25; Savage, 225; Crane, 25; and Sidney, Mont., 450.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 66,000 square miles.

Annual run-off in acre-feet: Yellowstone River at Glendive, Mont., 1903–1912—Maximum, 13,300,000; minimum, 8,500,000; mean, 10,800,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to deliver water, season of 1913: 37,799 acres.

Area under water-right applications, season of 1913: 29,737 acres.

Length of irrigating season: May 15 to October 10—148 days.

Average elevation irrigable area: 1,900 feet.
Average annual rainfall on irrigable area: 16.5 inches, for 7 years; 18.9 inches for 1912.
Range of temperature on irrigable area: —46° to 110° F.
Character of soil of irrigable area: Deep sandy loam predominates; some alkali and gumbo.
Principal products: Grain, forage crops, and vegetables.
Principal markets: Minneapolis, St. Paul, and Duluth, Minn.; local markets consume forage crops and vegetables.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 21, 1908; April 24, 1909; March 7, March 24, May 1, August 28, and November 8, 1911; March 1 and April 30, 1912; May 28 and June 23, 1913.
Location of lands opened: Tps. 18 and 19 N., R. 57 E.; Tps. 19 and 20 N., R. 58 E.; Tps. 21, 22, 23, 24, and 25 N., R. 59 E.; and T. 24 N., R. 60 E., Montana principal meridian: Tps. 150 and 151 N., R. 104 W., fifth principal meridian.
Present status of irrigable area opened: 6,939.61 acres entered subject to the reclamation act; 904 acres open to entry; 1,514 acres State land; 31,556.48 acres private land.
Limit of area of farm unit: Public, 80 acres; private, 160 acres.
Duty of water: 2½ acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $42.50 and $45.
Annual operation and maintenance charge: $1 per acre per annum for $42.50 water-right applicants, and $1.50 per acre for 1913 for $45 water-right appli-

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.
Construction recommended by board of engineers April 23, 1904.
Construction authorized by Secretary May 10, 1904.
Main canal: 61 miles completed March, 1909.
Lower Yellowstone Dam completed February, 1910.
First irrigation by Reclamation Service, season of 1909.
Entire project 95 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Lower Yellowstone project provides for the diversion of water from the Yellowstone River at a point 18 miles below Glendive, Mont., into a canal on the west side of the river, which extends down the valley a distance of 67 miles to the confluence of the Yellowstone and Missouri Rivers, conveying water for the irrigation of land lying between it and the Yellowstone River. The fall of the water which will be discharged from the main canal into lateral KK at a point 19 miles below the headgates will be utilized to operate turbines direct connected to centrifugal pumps for raising water to irrigate approximately 3,000 acres of excellent bench land. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith. The completed features are the Lower Yellowstone Dam and diversion works; the main canal for a distance of 61 miles and the complete lateral system in connection therewith. Sublaterals and extensions of a few main laterals will be constructed as the needs of water users require. The features for future construction are the pumping plant, the remaining 6 miles of the main canal, and about 61 miles of laterals which, when completed, will irrigate approximately 20,000 acres.

CONSTRUCTION DURING FISCAL YEAR.

One mile of telephone line was built to Savage headquarters, making a total of 80 miles of completed line. Lateral D was extended 1½ miles to irrigate 180 acres of land. Four and one-half miles of laterals were constructed by contract up to the end of the fiscal year on the extensions of laterals K, Q, R, and S, which, when completed, will irrigate about 3,550 acres. Twelve hundred cubic yards of rock were placed below the apron of the Lower Yellowstone Dam.

OPERATION AND MAINTENANCE.

During the season of 1912, from June 22 to October 20, 5,068 acres were irrigated, 4,915 being in Montana and 153 in North Dakota, and comprising 126 farms, of which 119 are in Montana and 7 in North Dakota. The small amount of irrigating done during 1912 was due to the heavy rains during the growing season. The duty of water was 1.19 acre-feet per acre. From the first of September to the close of the irrigating season water was delivered by rotating in periods of 10 days. This method of water delivery reduced the seepage and also cut down the operating cost.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Lower Yellowstone project.

Item.	1909	1910	1911	1912	1913 to June 30
Acreage for which service was prepared to supply water	40,133	40,133	[2]37,867	37,880	[2]37,799
Acreage irrigated	7,113	8,655	15,443	5,068	4,716
Number of farms irrigated	77	97	230	126	135
Miles of canal operated	[1]110	118	158	125.5	133
Water diverted (acre-feet)	56,028	51,142	52,542	15,404	12,910
Water delivered to land (acre-feet)	5,120	12,485	21,799	6,058	5,438
Per acre of land irrigated (acre-feet)	.72	1.44	1.41	1.19	1.15

[1] Estimated. 1909 and 1910 reported as 60.5, which included only main canal.
[2] Reduction due to amendments of farm unit plats.

SETTLEMENT.

At the present time there are 17 homesteads subject to entry. During the fiscal year there have been 6 entries made, 2 relinquishments, 6 assignments, and 13 private holdings transferred. The present class of settlers has previously raised grain, and their experience with diversified farming is limited. It is estimated that for the highest success there should be four times the present number of settlers on the project. During the fiscal year the Great Northern Railway completed a grade and laid the steel from Snowden to Fairview, and have also completed the grade from Fairview to Sidney, and are rushing to completion the grade from Sidney westerly toward Lewistown. The incoming of this road has created confidence on the part of the landowners, and it is expected that additional farmers will gradually locate in the valley.

General data, Lower Yellowstone project.

Item.	Whole project.	Farms irrigated.
Population on farms (estimated)	600	298
Number of farms	347	126
Average population on farms, per farm	1.7	2.4
Inexperienced in farming	241	33
Experienced in farming	106	93
Humid farming	66	63
Irrigation farming	40	30
Owners on farms	190	80
Tenants on farms	21	14
Neither owners nor tenants on farms	136	32
Number of public schools	15	13
Number of towns	7	7
Population of towns (estimated)	800	800

PRINCIPAL CROPS.

In the season of 1912 grasshoppers damaged the crops, especially the alfalfa, to an estimated extent of $10,000. Three hailstorms passed over sections of the valley, the one causing the most damage occurring on August 4, which destroyed crops in its path comprising, approximately, 2,000 acres. The estimated value of all the lost crops is placed at $50,000.

Crop statistics, Lower Yellowstone project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	1,284.5	Ton	2,658	$16,170.00
Barley	2,457	Bushel	56,973	17,938.10
Sugar beets	8	Ton	115.5	578.00
Corn	23	Bushel	545	230.00
Flax	2,469.5	do	27,367	28,334.54
Garden	21.3			1,239.00
Hay	871	Ton	946	5,507.00
Oats	3,869	Bushel	159,249.9	48,230.94
Potatoes	73.8	do	11,865	5,821.50
Wheat	6,356.6	do	117,180	74,061.51
Miscellaneous	63.5			1,419.41
Total cropped	17,497.2			199,530.00

NOTE.—Crops raised on irrigated and nonirrigated lands covered by water-right applications.

FINANCIAL STATEMENTS.

Assets and liabilities, Lower Yellowstone project, June 30, 1913.

ASSETS.

Accounts receivable:			
Water-right building charge		$3,478.33	
Water-right operation and maintenance charge		93,824.73	
			$97,303.06
Inventories:			
Equipment in use—			
Animals	$3,580.63		
Mechanical and other	16,024.45		
		19,605.08	
Materials, supplies, etc., in storehouse		3,916.80	
Cement		147.67	
Structural iron and steel		3,078.72	
Lumber		801.41	
Fuel		259.30	
Undistributed cost (freight and handling on inventory property)		475.30	
			28,284.28
Improvements to land:			
Gross cost		2,785,478.63	
Less credits from incidental operations—			
Rentals of cottages	3,258.09		
Rentals of telephones	4,831.01		
Loss on mess operations	[1] 6,298.87		
Profits on mercantile stores	640.33		
Profits on hospital	14.94		
Adjustments, contractor's freight refunds	21,261.33		
		23,706.83	
			2,761,771.80
Deferred operation and maintenance revenues			255,042.89
Total assets			3,142,402.03

[1] Deduct.

LIABILITIES.

Accounts payable:			
Labor		$4,434.04	
Purchases		552.02	
Contract holdbacks		14,693.76	
Freight and express		483.56	
Passenger fares		55.35	
Land agreements		932.00	
Miscellaneous		11,927.68	
			$33,078.41
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued		7,361.00	
Building advance collections		29,431.40	
			36,792.40
Unadjusted credits, net earnings of Government animals			1,583.36
Net investment:			
Disbursement vouchers	$3,115,479.80		
Transfers received	92,395.23		
		3,207,875.03	
Less—			
Collection vouchers	105,133.33		
Transfers issued	31,793.84		
		136,927.17	
			3,070,947.86
Total liabilities			3,142,402.03

Feature costs, Lower Yellowstone project, to June 30, 1913.

Diversion works:			
Lower Yellowstone Dam			$331,916.63
Canal system:			
Earthwork		$1,416,311.97	
Structures		577,756.41	
			1,994,068.38
Distribution system:			
Earthwork		227,027.22	
Structures		20,988.08	
			248,015.30
Highway bridges:			
Highway bridges (3)		8,643.69	
Bridges, force account		2,959.06	
Highway bridges, schedule No. 1		22,561.79	
Highway bridges, schedule No. 2		22,368.71	
Wooden structures		14,021.69	
Bridge approaches		4,275.98	
			74,830.92
Real estate			28,958.51
Buildings			18,162.03
Telephone system			23,717.32
Irrigable land, land and soil surveys, and farm units			15,356.80
Examination of project as a whole			50,452.74
Operation and maintenance:			
Diversion works		76,981.72	
Main canal system		112,347.99	
Lateral system		81,012.54	
Drainage system		507.04	
Farms		13,626.46	
Buildings and grounds		78,731.94	
Telephone system		9,692.92	
Real estate		945.31	
Automobile		2,948.55	
General expense (undistributed)		3,728.14	
			380,522.61
Total building and operation and maintenance cost			3,166,001.24

Operating revenues and expenses, Lower Yellowstone project, to June 30, 1913.

EXPENSES.

Development, maintenance		$76,981.72
Carriage:		
(*a*) Operation	$19,836.41	
(*b*) Maintenance	92,511.58	
		112,347.99
Distribution:		
(*a*) Operation	$11,330.48	
(*b*) Maintenance	69,682.06	
		81,012.54
Drainage, maintenance		507.04
Undistributed expenses		109,673.32
		380,522.61

REVENUES.

Operation and maintenance, accruals	124,934.97
Operation and maintenance, forfeitures	18.75
Operation and maintenance, advance payment	488.50
Rental of lands and buildings	25.00
Miscellaneous revenues	12.50
Deferred operation and maintenance revenues	255,042.89
	380,522.61

Estimated cost of contemplated works, Lower Yellowstone project.

Main canal system	$7,000
Distributing system	40,000
Highway bridges	2,700
Total estimated cost of contemplated works	49,700

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION AND CLIMATIC CONDITIONS.

Counties: Sioux, Scotts Bluff, Banner, and Morrill, Nebr.; Natrona, Carbon, Converse, and Laramie, Wyo.

Townships: 19 to 27 N., Rs. 48 to 67 W.; 26 to 30 N., Rs. 83 to 85 W., sixth principal meridian.

Railroads: Chicago, Burlington & Quincy; Union Pacific; Chicago & Northwestern; Colorado & Southern.

Railroad stations and estimated population, January 1, 1913: Bridgeport, 585; Bayard, 310; Minatare, 510; Scotts Bluff, 2,431; Mitchell, 736; Morrill, 400; and Henry, Nebr., 75; Torrington, 300; Vaughn; Lingle, 75; Barnes; Fort Laramie; Whalen; Guernsey, 300, and Casper, Wyo., 3,400.

WATER SUPPLY.

Source of water supply: North Platte River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre feet of North Platte River: At Pathfinder, Wyo. (12,000 square miles), 1905 to 1912—Maximum, 2,420,000; minimum, 870,000; mean, 1,453,000. At Guernsey or Whalen, Wyo. (16,200 square miles), 1900 to 1912—Maximum, 2,690,000; minimum, 983,000; mean, 1,650,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

INTERSTATE UNIT.

Area for which the service is prepared to supply water, season of 1913, 109,272 acres.

Area under water-right applications and rental contracts, season of 1913, 90,121 acres.

Length of irrigating season: From April 1 to September 30—183 days.
Average elevation of irrigable area: 4,100 feet above sea level.
Average annual rainfall on irrigable area: 15 inches; 1912, 19.85 inches.
Range of temperature on irrigable area: —25° to 104° F.
Character of soil of irrigable area: Sandy loam.
Principal products: Alfalfa, cereals, corn, sugar beets, potatoes.
Principal markets: Omaha, Nebr.; Kansas City and St. Joseph, Mo.; Denver, Colo.; central Wyoming.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: July 29, 1907; May 29, 1908; June 16, 1908; November 12, 1908; March 3, 1909; March 27, 1909; June 2, 1909; March 12, 1910; April 4, 1910; June 6, 1910; June 25, 1910; July 2, 1910; September 10, 1910; March 7, 1911; March 24, 1911; April 21, 1911; December 30, 1911; March 13, 1912; March 14, 1912; March 19, 1912; May 23, 1912; June 24, 1912; September 5, 1912; February 5, 1913; March 11, 1913 (2); March 29, 1913; June 23, 1913.
Location of lands opened: Ts. 22 to 26 N., Rs. 52 to 65 W., sixth principal meridian.
Present status of irrigable lands opened: Fifty-nine thousand three hundred and sixty-eight acres entered subject to the reclamation act; 6,653 acres open to entry; 644 acres withdrawn from entry; 9,998 acres of State lands (including 2,179 acres of Carey Act lands); 32,820 acres in private ownership (including 12,289 acres of Carey Act lands).
Limit of area of farm units: Public, 80 acres; private, 160 acres.
Duty of water: Two and one-half acre-feet per acre per annum at the farm.
Charges per acre of irrigable land: Building, $45 and $55; annual operation and maintenance charge, $1.10 per acre.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.
Construction recommended by director, March 7, 1903.
Construction conditionally authorized by secretary March 14, 1903.
Contract with North Platte Canal & Colonization Co. for right of way for first part of Interstate Canal, December 22, 1904.
First irrigation by Reclamation Service, season of 1908.
Interstate Canal, first 95 miles completed May, 1908.
Whalen Diversion Dam completed February, 1909.
Pathfinder Dam completed June, 1909.
Pathfinder Dike completed May, 1911.
Interstate Canal, 136 miles completed June 30, 1913.
Entire project, comprising storage and interstate units, 84 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the North Platte project provides for the storage of flood waters of North Platte River in a reservoir controlled by the Pathfinder Dam, about 3 miles below the junction of the North Platte and Sweetwater Rivers and 50 miles southwest of Casper, Wyo., and in smaller reservoirs along the canal lines; and the diversion of water from North Platte River by a dam near Whalen, Wyo., into the Interstate Canal, supplying water for lands on the north side of the river, and into the Fort Laramie Canal, watering lands on the south side of the river. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.
The completed features are: Pathfinder Dam and Dike, Whalen Diversion Dam, the first two divisions of the Interstate Canal, lateral systems of districts 1 and 2 of the Interstate Canal system, Reservoir No. 1, known as Lake Alice. Construction is in progress upon Reservoir No. 3, known as Lake Minatare, the third division of the Interstate Canal, and the third lateral district. The Fort Laramie Canal system, covering approximately 107,000 acres, remains for future construction.

CONSTRUCTION DURING FISCAL YEAR.

Pathfinder Reservoir.—The gap in the spillway weir was closed, thereby increasing the storage capacity of the reservoir from 1,025,000 to 1,070,000 acre-feet. The concrete bulkhead at the intake end of the south tunnel was lengthened 25 feet. Such portion of the concrete floor as had been destroyed during the season of 1912 has been replaced. The lower portion of the south tunnel was enlarged so as to admit the discharge of a larger volume of water without sealing. In order to protect the control piping of the south tunnel valves, an auxiliary tunnel was driven around the south abutment of the dam connecting the grillage chamber with the canyon wall below the dam. The control piping was placed in this auxiliary tunnel, and the control valves are attached at the lower end of this tunnel. In order to prevent further destructive action by the discharge of the valves in the south tunnel, a cross-cut was driven from the auxiliary tunnel into the south tunnel, entering the latter at the lower end of the concrete bulkhead and providing a free passage of air at this juncture, thus eliminating the violent hammering, which had been caused by the vacuum forming at this point. Repair work was also done on the valves of the south tunnel. The operating system of the gates of the north tunnel was overhauled.

Interstate Canal.—Divisions 1 and 2 of the Interstate Canal, which include the first 95 miles, were completed in May, 1908. The third division includes the Highline, which is an extension of the main canal, the Lowline, which heads at Lake Minatare and extends beyond Red Willow Creek, and the Reservoir Supply Canal, which extends from Reservoir No. 1 to Lake Minatare, 5 miles in length. The Highline Canal and lateral system were completed in the early spring of 1913, and this system is now being operated. Contracts were let for 17 schedules of the Lowline Canal in December, 1912, covering all excavation of this canal from Lake Minatare to Wild Horse Creek, a distance of 28½ miles. Sixty-five per cent of this work was completed at the end of the fiscal year. Informal contracts were let during June, 1913, for 5 schedules of lateral earthwork under the Lowline Canal. Surveys are in progress on the extension of the Lowline Canal and lateral system with a view to letting this work at an economical rate of progress. Cross-drainage structures, lateral headgates, road crossings, and other miscellaneous structures are being built on the Lowline Canal system by Government forces at a rate of progress in keeping with the earthwork.

Supplementary storage.—In the development of the third lateral district it is necessary to provide supplementary storage reservoirs. There are three available reservoir sites, Nos. 1, 2, and 3, with capacities of 11,400, 27,000, and 67,000 acre-feet, respectively. Reservoir No. 1 is often referred to as Lake Alice, and Reservoir No. 3 is known as Lake Minatare. Construction work was started on Lake Alice in the summer of 1911, and Dam No. 1½, closing a low saddle on the east boundary of this reservoir, was completed in the spring of 1912. This involved the excavation of about 128,000 cubic yards of earth, and the quarrying, hauling, and placing of about 13,000 cubic yards of rock. The principal outlet of this reservoir is a concrete regulating structure built in conection with Dam No. 1½ and supplying water to the reservoir-supply canal. Test borings and investiga-

tions of dam site No. 1 were begun during the summer of 1911. The cut-off trench was started during the fall of 1911, suspended during winter, and work resumed in April, 1912. The construction of the earthwork on Dam No. 1 began about May 1, 1912, under contract, and was completed in July, 1912. The hauling and placing of riprap material on this dam was completed in January, 1913. The building of Dam No. 1 involved the excavation of about 238,000 cubic yards of earth and 17,300 cubic yards of brule clay. The riprapping of this dam involved the quarrying, hauling, and placing of about 5,970 cubic yards of gravel and of about 16,000 cubic yards of rock. Construction work began on Dam No. 3 at Lake Minatare in June, 1912. The construction of this dam involves the handling of about 630,000 cubic yards of earth fill, 157,000 cubic yards of gravelly material, 14,000 cubic yards of unscreened gravel, 14,000 cubic yards of brule-clay excavation, and 16,000 cubic yards of concrete. The progress has been materially improved since the opening of the present working season, the contractor having sublet practically all of the earth portion of the embankment and the placing and form work of the concrete. At the end of the fiscal year his contract was 15 per cent completed.

Drainage investigations.—The necessary surveys and investigations preceding the construction of drainage works have been continued. These investigations include borings over the affected areas and tracts likely to become seeped to determine the subsoil conditions, the elevation, and periodic variation of the water table, and other factors bearing upon the location and construction of the drainage works.

Drainage works.—During the fiscal year there were completed the Banner and McAllister drains. The Banner drain involved 3,300 cubic yards of wet open-ditch excavation and the laying of 5,950 feet of 12-inch tile. The McAllister drain involved the placing of 12,250 linear feet of drain tile, of which 10,350 feet were 15-inch and 1,900 feet were 10-inch. On the Sunflower drain 2,900 linear feet of 12-inch tile were placed and the work was temporarily discontinued because of quicksand, making further progress with the trench machine or by handwork impracticable. On the Dunham drain 7,470 feet of drain tile were placed, and on the Hiersche open drain 29,270 cubic yards were excavated by means of the drag-line excavator.

OPERATION AND MAINTENANCE.

The system operated during 1912 comprised the Pathfinder Reservoir, the Whalen diversion works, Reservoir No. 1, and the first, second, and a portion of the third lateral districts, including 95 miles of main canal, 4.6 miles of reservoir-supply canal, and 503 miles of laterals. Water to the amount of 113,251 acre-feet was delivered to 777 farms, aggregating 50,250 acres in crops, or an average of 2.25 acre-feet per acre. Water was also furnished under contract to 58 farms in the North Platte Canal & Colonization Co.'s tract, aggregating 5,381 acres of crops. The maximum diversion at the Whalen Dam into the Interstate Canal was 1,370 second-feet, and the total diversion during the season was 239,588 acre-feet. The season was unusually wet, making it difficult to cure the alfalfa hay to make it marketable.

During the season of 1913, 70,937 acres of land are being supplied with water in the first, second, and third lateral districts under water-right applications, 369 acres under rental agreements, and 17,837 acres under contract with the North Platte Canal & Colonization Co. Of this acreage there are cultivated 7,160 acres in the North Platte Canal & Colonization Co.'s tracts and 58,692 acres in the land subject to the reclamation act under water-right applications and rental agreements. Water was diverted into the main canal on April 16, the maximum diversion to June 30 being 1,270 second-feet. There have been no breaks or interruptions of any kind. With the beginning of the present irrigation season the supply-on-demand system of water delivery was adopted. It became apparent, however, that this system must be suspended during periods of heavy demand. In this case the system of four days' delivery, followed by four days' non-delivery, will again be used, as it has proven generally satisfactory during periods of extreme demand. On June 30 the Pathfinder Reservoir contained 608,570 acre-feet of water.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, North Platte project.

Item.	1909	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	87,468	87,994	96,898	103,837	109,272
Acreage irrigated	[1] 41,214	[1] 48,537	[1] 49,411	[1] 55,631	[1] 65,852
Number of farms irrigated	[2] 628	[2] 688	820	835	982
Miles of canal operated	467	487	534	602	645
Water stored (acre-feet) maximum	740,000	320,000	393,500	1,012,000	608,570
Water delivered to land (acre-feet)	[2] 109,166	[2] 166,238	[2] 190,427	[2] 113,251	.....
Per acre of land irrigated (acre-feet)	[2] 3.17	[2] 3.93	[2] 4.26	[2] 2.25	.....

[1] Includes acreage in crops on North Platte Canal & Colonization Co. lands.
[2] Exclusive of lands under North Platte Canal & Colonization Co. tract.

SETTLEMENT.

The conditions of settlement have not changed materially during the past year. There were 1,055 farms open to irrigation in 1912, of which 818 are public lands and 237 private holdings, including school lands. The total population on farms in 1912 was 2,504. Of the above 1,055 farms, there were 278 on which water was not used, leaving 777 farms on which water was used beneficially. In 1911 there were 956 farms open to irrigation, of which 227 were private holdings. Of the above, 58 farm units and 117 private holdings had no improvements on them. In 1910 there were 878 farms open to irrigation, of which 203 were in private ownership. Of the above 878 holdings, 163 were without any improvements. The following summary shows the number of transfers made on homestead and deeded lands for the years 1909 to 1912, inclusive:

	1909	1910	1911	1912
Number of transfers made on homestead lands	30	43	17	39
Number of transfers made on deeded lands	2	10	7	10
Total	32	53	24	49

During the period of 1909 to 1912, inclusive, 2 farm units (public land) and 1 unit of private land changed hands three times; 12 units of public land and 3 units of private land changed hands twice; and 101 farm units of public land and 18 units of private land changed ownership once each. The total number of changes from 1909 to 1912, inclusive, was 158, and the number of farms which changed ownership was 137. The relatively small number of changes during four years is largely due to the small demand which has existed during this period for investments of this character.

PRINCIPAL CROPS.

The crop statistics of this project for the past several years show a constantly diminishing percentage of small grains and a corresponding increase in alfalfa, potatoes, and sugar beets. The season of 1912 was generally favorable to crop conditions, because of the abundant rainfall throughout the growing season, although this advantage was somewhat offset by the damage which the alfalfa hay suffered by reason of excessive rains. The average crop yield was better than in any year since 1909. Three hailstorms visited the project, on June 19, covering a portion of the Upper Sheep Creek Valley, and on August 4 and September 3, covering a portion of Sunflower Flats. The damage was considerable, but the affected areas were fortunately small. The crop conditions during the current year promise a good yield. Some small areas have been visited by hail, but the damage is not extensive from this cause. About 70 per cent of the area farmed is in alfalfa and the acreage of sugar beets is nearly five times that of 1912.

Crop statistics, North Platte project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa hay	19,512	Tons	42,604	$213,020
Alfalfa seed	1,174	Bushels.	977	8,793
Barley	1,156	do	31,064	15,532
Corn	6,260	do	96,821	38,728
Oats	10,093	do	295,360	103,376
Potatoes	1,192	do	121,392	30,348
Rye	996	do	8,700	4,350
Sugar beets	667	Tons	7,132	39,939
Wheat	4,390	Bushels.	75,354	50,487
Miscellaneous	1,811			16,882
Total cropped	47,251			521,455
Other purposes	2,999			
Total area irrigated	50,250			

SALE OF SUPPLEMENTAL STORAGE RIGHTS FROM PATHFINDER RESERVOIR TO PRIVATE CANALS.

Following the plan briefly mentioned in the eleventh annual report, contracts were entered into with six canal companies or districts in Nebraska for the sale of supplemental storage rights from Pathfinder Reservoir. Several other districts have made applications to purchase, but were unable to complete the necessary arrangements. The North Platte Canal & Colonization Co. diverting from the North Platte River through the headgates of the Interstate Canal, has made application to purchase such permanent storage rights, but was

unable to enter into the required agreement, because of a pending reorganization of this company. They have, therefore, entered into a temporary rental agreement for the current season. A number of companies and districts diverting from the river in Nebraska have entered into similar rental agreements. A reconnoissance examination of the irrigation possibilities above the Pathfinder Reservoir has been made. The findings have resulted in certain important conclusions relative to future diversions in that territory and the required action to be taken to insure adequate protection of the rights of prior appropriators below Pathfinder, without hindering legitimate development in the section above this reservoir.

FORT LARAMIE CANAL INVESTIGATIONS.

In accordance with the recommendation of the consulting board of May 3, 1912, a form of trust deed was prepared for execution by owners of deeded lands and submitted to a number of trust companies for consideration. The attorneys of these trust companies found certain legal objections to the trust deeds, and the matter was resubmitted to the department for further action. The department revised and modified certain features of the deeds, and they were again submitted to several trust companies in Nebraska and Wyoming, most of which have lately forwarded their schedule of rates so that the matter may be presented to the interested landowners at an early date for further consideration and action.

ORDER DATED SEPTEMBER 5, 1912.

Whereas, by order of March 13, 1912, it was provided that water users under the North Platte project whose water-right applications were subject to public notice of December 30, 1911, for said project, might receive water for irrigation in the season of 1912 without prior payment of the portion of the instalment for operation and maintenance for 1912, amounting to $1.25 per acre of irrigable land, subject to certain conditions; and

Whereas, one of the conditions was that the charge for operation and maintenance per acre of irrigable land for the season of 1912 should be $1.40 instead of $1.25.

Now therefore by virtue of the authority given me by the act of Congress approved June 17, 1902 (32 Stat., 388), commonly called the reclamation act and by acts supplementary thereto and amendatory thereof, it is hereby ordered:

That water users under said project who, having availed themselves of the benefits of said order of March 13, 1912, desire to make payment of the charge for maintenance and operation for the season of 1912 on or before October 1, 1912, shall be allowed a discount of 5 cents per acre upon the charge for maintenance and operation as fixed in said order of March 13, 1912, if payment of the charge for maintenance and operation for season of 1912 is made on or before October 1, 1912.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

ORDER DATED FEBRUARY 5, 1913.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and of the act of February 13, 1911 (36 Stat.,

902), the following order for the North Platte project, Nebraska-Wyoming, is hereby issued as supplemental to the public notice of December 30, 1911, and public notices or orders amendatory thereof or supplementary thereto, viz:

For all lands subject to the said public notices, for which water has been furnished and paid for on a rental basis for the calendar year 1911, or the calendar year 1912, or both those years, no payment shall be required of the portions of instalments for operation and maintenance accruing under the terms of said notices due December 1, 1910, or December 1, 1911, as the case may be, for the years during which water was furnished and paid for on a rental basis.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 11, 1913.

1. In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and of the act of February 13, 1911 (36 Stat., 902), notice is hereby issued for the North Platte project, Nebraska-Wyoming, as supplemental to public notices of December 30, 1911, March 14, 1912, and notices and orders amendatory thereof or supplementary thereto for the said project, viz:

2. All lands in private ownership subject to the said public notices and orders shall be subject to all the charges, terms, and conditions announced in said public notices and orders, provided, that for all water-right applications filed for such lands during the calendar year 1913, the first installment of the building, operation and maintenance charges shall be due on December 1, 1913, and subsequent installments shall become due on December 1 of each year thereafter.

3. Until further notice the amount of the portion of installment for operation and maintenance, and the conditions under which payment therefor shall be made, shall be as heretofore announced.

4. The object of this notice is to effect a temporary suspension, during the calendar year 1913, of the provisions of prior public notices and orders in so far as they provide for the accumulation of charges for building, operation and maintenance against lands in private ownership.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 11, 1913.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows for the lands under the North Platte project, Nebraska-Wyoming, viz:

1. The portion of installment for operation and maintenance due December 1, 1912, which must be paid before water is furnished for the irrigation season of 1913, and the portion of the installment for operation and maintenance which falls due on December 1 of 1913, and of each year thereafter, is hereby reduced to $1.10 per acre of irrigable land until further notice; and such payment shall entitle the applicant to a maximum water supply of not to exceed 2.5 acre-feet per acre of irrigable land per annum; in no event, however, in excess of the amount needed on the land for beneficial use.

2. Should the quantity of water stated be found to be insufficient for the proper irrigation of any tract, additional water may be obtained on application therefor by the landowner or entryman, and payment for same at the rate of 25 cents per acre-foot shall become due on December 1 of the year in which the water is used, and such sum must be paid before water is furnished to such tract in the following year.

3. Any deficiency in the amounts to be paid for operation and maintenance charge which may arise by reason of the reduction of such charge shall be duly announced and added to the portion of the installment for operation and maintenance falling due after such announcement.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 29, 1913.

1. Additional lands will be placed under irrigation in the season of 1913, in the third lateral district of the North Platte project, Nebraska-Wyoming, under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), shown on farm unit plats of the following townships, viz: Sixth principal meridian—T. 22 N., R. 53 W.; T. 22 N., R. 52 W.; T. 22 N., R. 51 W.; T. 24 N., R. 56 W.; approved March 12, 1913.

2. The said lands shall be subject to all the terms and provisions of the public notice of March 14, 1912, for other lands in the said district, with the following exceptions, viz:

3. All water-right applications shall be filed in the office of the United States Reclamation Service at Mitchell, Nebr., and all payments of charges for building, operation and maintenance shall be made to the special fiscal agent of the Reclamation Service at Mitchell, Nebr.

4. For lands heretofore entered and for lands in private ownership opened to irrigation in 1913 the first installment of the charges for building, operation and maintenance, shall be due on December 1, 1914.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, North Platte project, June 30, 1913.

ASSETS.

Cash in special financial agent's possession awaiting remittance		$81.92
Accounts receivable:		
Miscellaneous	$472.25	
Water right building charge	104,939.87	
Water right operation and maintenance charge	97,778.12	
		203,190.24
Inventories:		
Mercantile stores	88.00	
Equipment in use—		
Animals $18,395.00		
Mechanical and other 44,460.35		
	62,855.35	

Inventories—Continued.			
Materials, supplies, etc., in storehouse		$30,299.34	
Cement		5,028.70	
Structural iron and steel		8,684.52	
Lumber		6,179.04	
Explosives		151.30	
Forage		4,874.95	
Fuel		4,295.69	
Products of local operations		6,619.28	
Goods in transit		3,862.26	
Undistributed cost, freight and handling, on inventory property		1,739.55	
			$134,677.98
Improvements to land:			
Gross cost		5,916,247.65	
Less credits from incidental operations—			
Rentals of cottages	$2,532.25		
Rentals of grazing lands	2,258.88		
Rentals of irrigation water	3,846.50		
Revenues, miscellaneous	7,226.16		
Loss on mess operations	[1] 9,075.46		
Profits on mercantile stores	4,758.57		
Profits on hospital	4,522.61		
Adjustments—			
Contractor's freight refunds	12,583.74		
Forfeitures by defaulting bidders and contractors	16,255.00		
		44,908.25	
			5,871,339.40
Total assets			6,209,289.54

LIABILITIES.

Accounts payable:			
Labor		11,039.04	
Purchases		9,678.88	
Contract estimates		28,094.41	
Contract holdbacks		13,639.24	
Freight and express		6,764.66	
Passenger fares		537.39	
Coupons		26.55	
Miscellaneous		22.94	
			69,803.11
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	261,689.18		
Building advance collections	10,155.00		
Building collections forfeited	3,470,40		
		275,314.58	
For depreciation on plant and equipment		2,191.74	
			277,506.32
Unadjusted credits, net earnings of Government animals			[1] 3,247.57
Net investment:			
Disbursement vouchers	5,604,089.24		
Transfers received	619,801.81		
		6,223,891.05	
Less—			
Collection vouchers	399,619.09		
Transfers issued	17,838.59		
		417,457.68	
			5,806,433.37
Excess operation and maintenance			58,794.31
Total liabilities			6,209,289.54

[1] Deduct.

Feature costs, North Platte project, to June 30, 1913.

Storage works:		
Pathfinder—		
Survey and examination	$20,306.96	
Lands submerged	205,490.06	
Masonry dam	867,235.82	
Dike, permanent	221,799.77	
Dike, temporary	14,929.61	
Spillway dams	14,420.42	
Emergency gate shaft, drainage tunnel	9,493.46	
South tunnel	187,785.45	
North tunnel	201,057.59	
Permanent buildings	5,000.00	
Auxiliary tunnel	20,045.31	
Crosscut tunnel	4,555.73	
South tunnel repairs	22,711.19	
Pile bridge	4,534.57	
		$1,799,365.94
Interstate (supplemental storage):		
Dam No. 1	138,364.02	
Dam No. 1½	70,244.39	
Dam No. 3	83,076.97	
		291,685.38
Diversion works:		
Whalen Dam (contract)	199,912.61	
Whalen Dam (Government force)	33,346.36	
Whalen Dam fish ladder	1,751.57	
		235,010.54
Guernsey Dam examination		11,308.73
Canal system:		
Earthwork (Interstate)	1,473,117.82	
Structures (Interstate)	662,744.62	
Riprap, third division, Main Canal (Interstate)	661.21	
Surveys—		
Alcova-Casper Canal	1,222.09	
Goshen Park	28,900.58	
Fort Laramie	19,513.77	
Sweetwater River	10,100.00	
Third division, Main Canal	14,290.10	
		2,210,550.19
Lateral system:		
Earthwork	402,092.31	
Structures	401,902.94	
Surveys, land lines	43,594.52	
		847,589.77
Real estate (rights and property), lands purchased (not submerged)		32,494.54
Water-right adjudications, North Platte River ditches		9,473.39
Drainage system		35,157.39
Preliminary operation and maintenance		430,893.78
Project buildings		12,718.00
Total building cost		5,916,247.65
Operation and maintenance:		
Pathfinder—		
Distribution	5,685.72	
Repairs	561.33	
		6,247.05
First division, Main Canal—		
Distribution	9,461.12	
Protection	15,992.83	
Repairs	64,056.93	
		89,510.88

Operation and maintenance—Continued.		
Second division, Main Canal—		
Distribution	$6,754.36	
Protection	7,199.59	
Repairs	11,594.37	
		$25,548.32
Rawhide, first and second lateral districts—		
Distribution	51,966.82	
Protection	2,804.11	
Repairs	27,859.69	
		82,630.62
Third lateral district—		
Distribution	4,996.62	
Protection	449.35	
Repairs	5,206.28	
		10,652.25
Total operation and maintenance cost		214,589.12
Total building and operation and maintenance cost		6,130.836.77

Operating revenues and expenses of North Platte project to June 30, 1913.

EXPENSES.

Development:		
Operation	$5,685.72	
Maintenance	561.33	
		$6,247.05
Carriage:		
Operation	25,453.95	
Maintenance	64,056.93	
		89,510.88
Distribution:		
Operation	74,170.85	
Maintenance	44,660.34	
		118,831.19
Excess revenues over expenses		58,794.31
		273,383.43

REVENUES.

Operation and maintenance, accruals	263,180.88
Operation and forfeitures	1,058.40
Operation and advance payment	524.40
Rental of irrigation water	8,619.75
	273,383.43

The following tabulation presents the principal features of the interstate unit of this project which are as yet uncompleted, but on which construction work is in progress, together with the amounts allotted therefor, expenditures to June 30, 1913, and balances remaining for their completion. It is estimated that these features will be completed with the amounts shown in the "balance" column, except the item of drainage.

Estimated cost of contemplated works.

Feature.	Allotted.	Expenditures.	Balance.
Dam No. 3	$544,000.00	$83,076.97	$460,923.03
Lowline Canal	209,831.09	82,201.19	127,629.90
Third lateral district	354,719.21	184,277.77	170,441.44
Drainage	83,991.95	35,157.39	48,834.56
Operation and maintenance	283,049.31	214,589.12	68,460.19
Total	1,475,591.56	599,302.44	876,289.12

NEVADA, TRUCKEE-CARSON PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Project*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Churchill, Storey, and Lyon.
Townships: 17 and 18 N., Rs. 17 to 30 E.; 19 N., Rs. 26 to 31 E.; 20 N., Rs. 22 to 31 E., Mount Diablo meridian.
Railroad: Southern Pacific.
Railroad stations and estimated population January 1, 1913: Fernley, 25; Hazen, 100; Fallon, 1,000; and Lahontan, 300.

WATER SUPPLY.

Source of water supply: Truckee and Carson Rivers.
Area of drainage basin: 3,450 square miles.
Annual run-off in acre-feet: Truckee River at Tahoe (519 square miles), 1901 to 1912, maximum, 703,000; minimum, 112,000; mean, 304,000. Truckee River, near Vista and Clark (1,740 square miles), 1900 to 1912; maximum 2,222,000; minimum, 359,000; mean, 872,000. Carson River at Empire (988 square miles), 1901 to 1911, maximum, 655,000; minimum, 178,000; mean, 414,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to deliver water, season of 1913: 52,039 acres.
Area under water-right applications and rental contracts, season of 1913: 45,313 acres.
Length of irrigation season: From April 1 to October 15—198 days.
Average elevation of irrigable area: 4,000 feet above sea level.
Average annual rainfall on irrigable area: 4 inches. (1912, 4 inches.)
Range of temperature on irrigable area: 0° to 105° F.
Character of soil of irrigable area: Exceedingly variable; sand, sandy loam, clay, adobe, and volcanic ash.
Principal products: Alfalfa, small grain, potatoes, onions, sugar beets, and truck crops.
Principal markets: Nevada mining camps and California cities.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: May 6, 1907; November 1, 1907; January 30, 1908; April 4, 1908; June 5, 1908; December 26, 1908; March 1, 1909; September 28, 1909; April 26, 1910; September 16, 1910; April 22, 1911; October 17, 1911; February 8, 1912; June 13, 1912; January 17, 1913.
Location of lands opened: Ts. 17 to 20 N., Rs. 23 to 31 E., Mount Diablo meridian.
Present status of irrigable lands: 21,259 acres entered subject to the reclamation act; 328 acres open to entry; 28,767 acres withdrawn from entry; 102 acres State lands; 46,117 acres in private ownership (including 10,031 acres of railroad lands).
Limit of area of farm units: Public, 80 acres; private, 160 acres.
Duty of water: 3 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $22 and $30.
Annual operation and maintenance charge per acre of irrigable land: $0.75.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary March 14, 1903.
Truckee Canal completed June, 1905.
Carson River headworks and main distributing canals completed September, 1905.
First irrigation by Reclamation Service, season of 1906.
Truckee Canal chute completed November, 1910.
Lahontan Dam commenced January, 1911.
Lahontan Dam 43.4 per cent completed June 30, 1913.
Entire project 75.9 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Truckee-Carson project provides for the storage of water in a number of small reservoirs on the headwaters of Truckee River, in Lake Tahoe, in the Alkali Flat Reservoir, near Churchill, Nev., and in Lahontan Reservoir, on Carson River, near Hazen, Nev.; the diversion of water from Truckee River by a dam about 20 miles below Reno, Nev., into the Truckee Canal, supplying water to lands in the Truckee and Carson River Valleys and to the Lahontan Reservoir; the diversion of water from Carson River by a dam near Dayton, Nev., for storage in Alkali Flat Reservoir and irrigating lands in Churchill Valley below that reservoir; and the diversion of water from Carson River by a dam about 5 miles below the Lahontan storage dam into two canal systems, one on either side of the river, watering lands in the lower Carson River Valley. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

The features of the above irrigation plan which have been completed are: The diversion dam in the Truckee River; the Truckee Canal, carrying water from this diversion and discharging into the Carson River above the site of Lahontan Dam; the Truckee Canal concrete chute; the diversion dam in Carson River, situated about 5 miles below Lahontan Dam; that portion of the complete distribution system which includes laterals taking out of Truckee Canal in the vicinity of Fernley and Hazen, and two main canal systems heading at Carson diversion dam and extending over the main portions of the project in Carson Sink, with Fallon as a center.

Construction is in progress on the Lahontan Dam for the storage of flood waters in the Carson River.

The features remaining for future construction are: The completion of the dam controlling the outflow from Lake Tahoe and the construction of distributing systems for the several extensions to the project which lie adjacent to and on all sides of the project as already constructed, and such extensions of the drainage system as are found necessary.

CONSTRUCTION DURING FISCAL YEAR.

Lahontan Dam.—The large construction plant for the dam is operated by electric power, which is generated in the hydro-electric plant at the site of the dam, utilizing the fall of about 120 feet from Truckee Canal to Carson River. Steam power is used only for operating small steam shovels and narrow-gauge locomotives, which are employed to some extent on the work. The construction program was carried out in accordance with a predetermined schedule, based upon the controlling factor of seasonal variations in the river flow.

The spillway pool excavation was finished. The concrete circular pool structure was completed, comprising about 14,000 cubic yards of heavy floor slabs and walls, in which were contained a drainage system, inspection galleries, and a 6-foot diameter inverted siphon under the river. The double 9-foot diameter outlet conduit was connected with the pool and operated for permanent diversion of the river. The temporary timber diversion dam and flume served their purpose without mishap during the construction of the work in the bed of the river and were finally dismantled after all purposes of river diversion had been served. The deep cut-off wall was extended into the left abutment and across the site of the spillway, thus completing the structure from end to end below the surface of the ground and to its full height, except where it crosses the temporary spillway on the left side. Permanent back filling along the cut-off wall was completed to the ground surface wherever practicable or

desired. All excavation for both spillways was completed in readiness for concrete, and the drainage system throughout these areas was mostly installed. The concrete walls and floors of the left spillway were entirely completed and partly back filled from the main dam cross section to and including the connection with the spillway pool. The concrete structure of the right spillway was completed except for the floor slabs from the spillway pool to the top of the hill at the end of the main sluiceway below the weir.

The river channel below the dam was excavated by steam shovel and teams, and the concrete and rubble paving of the bottom and the slope paving of the right bank were completed. After completing the large structures in the bed of the river the work of building the main embankment of the dam was commenced in September, and about the beginning of 1913 was brought up to the top of the pool wall, which was the desired height for temporary overflow by spring floods. This base of the dam, comprising about 62,000 cubic yards of material, was completed, including upstream paving, to a height of about 20 feet above the river bed. About a mile of 36-inch-gauge track was laid to the rock quarry, which was stripped by steam shovel. A series of mine drifts, 50 feet long with cross-cuts at the ends, was driven into the rock quarry. These were loaded with about 29.000 pounds of powder, and explosion was made on June 1, loosening about 30,000 cubic yards of riprap rock ready for steam shoveling and loading onto cars for transportation to the dam. The electric drag-line excavator was operated during most of the winter in stripping the top layer of silt or soil from the main borrow pit. Preparatory work was done looking toward resumption of placing embankment after the passage of the spring floods. Overflow of the dam base continued for about six weeks in May and June and work on the dam was resumed during the last week in June.

Plans and specifications were made and advertised for a set of 2 balanced valves, 8 feet in diameter; 14 sluice gates, 3 feet by 8 feet; and 2 sluice gates, 3 feet by 3 feet, all of heavy cast-iron construction, with bronze mountings and with hydraulic cylinder operating mechanism for installation in the outlet gate tower. The contract was awarded to the Rosedale Foundry & Machine Co. for the manufacture of these gates, and the entire equipment, comprising about 350 tons of metal, was shipped and mostly delivered at Lahontan before the end of June.

The sand-cement mill was completed and thereafter operated to the end of the current period in supplying cement used for the concrete structures.

Lahontan-Fallon transmission line.—Sixteen miles of 30,000 volt transmission line from Lahontan to Fallon were completed by contract, connecting with step-down transformers installed in the concrete block substation building, which was built by contract at Fallon and completed ready for the delivery of electric current in September, 1912. Since that time uninterrupted service has been supplied to the city of Fallon under the 10-year contract.

Drainage construction.—An open-cut drain, 1 mile long, averaging about 5 feet in depth, was excavated for the relief of 5 homestead tracts south and east of Fallon. Other smaller drain extensions were made in connection with annual cleaning of drains.

Ground-water surveys were made as a guide to the location of the first 4 miles of deep drainage system. About 4 miles of vitrified clay pipe, 8 inches to 15 inches in diameter, were purchased and delivered at Fallon for installation in this deep-drainage system. The work was advertised for contract, but, no bids having been received, preparations are in progress for doing the work by Government forces. To this end a gasoline power drag-line excavator, suitable for the purpose, was purchased for delivery about the end of the fiscal year.

Extension of distribution system.—Minor extensions or repairs of small canals and structures have been made by Government forces during the year.

OPERATION AND MAINTENANCE.

Annual delivery of water has varied from about 144,000 acre-feet in 1909 to a minimum of 63,000 acre-feet in 1912. The duty of water in 1909 was 5 acre-feet per acre, with a gradual improvement in 1910 to 4.65 acre-feet per acre; in 1911, 4.46 acre-feet per acre; and in 1912, 2.5 acre-feet per acre. The apparent high duty in 1912, however, was occasioned by the severe water shortage, and the crops really had less water than was needed for the best results.

There was a substantial loss of crops owing to the water shortage of 1912, and on that account concessions were made to the water users as to the time of collecting the required annual payment.

The snowfall of the winter 1912–13 on the watersheds was much less than normal and the water supply for the current season is again insufficient for the crop requirements. Showers in May and June served to produce a good growth in many crops, and the first cutting of alfalfa was harvested with the production of a greater tonnage than usual.

The customary force of men, varying from 4 to 20, with the employment of about 20 head of Government stock, was engaged during the fall, winter, and spring in the annual campaign of cleaning laterals and drains. The work suffered the usual interruptions by freezing ground in midwinter, but the desired results were accomplished and the system was kept in good repair. At times of greatest urgency farmers with their teams are employed by the day to assist in a portion of the cleaning and the repair work. In drain-ditch cleaning and other wet work it is difficult to get farmers to assist; therefore it is necessary to maintain a nucleus of Government men and animals to perform the harder parts of the maintenance work.

For " Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Truckee-Carson project.

Item.	1909	1910	1911	1912	1913 to June 30.
Acreage for which service was prepared to supply water	52,039	53,039	52,039	52,039	52,039
Acreage irrigated	29,325	27,557	30,139	36,620	36,620
Number of farms irrigated	334	415	469	497	494
Miles of canal operated	280	280	292	294	294
Water diverted (acre-feet)	199,639	177,576	262,619	170,763	.....
Water delivered to land (acre-feet)	144,023	128,249	143,746	62,707	.....
Per acre of land irrigated (acre-feet)	5.01	4.65	4.46	2.50	.....

SETTLEMENT.

With a few minor exceptions where water can be economically delivered, the unsettled portion of the project has remained withdrawn from entry and water-right application, and further settlement is not being encouraged pending the completion of Lahontan Reservoir. The following table shows settlement conditions during the past three years:

	1910	1911	1912
Number of farms	480	480	497
Number of relinquishments and transfers	25	39	41
Number of cancellations	36	14	6

For the most part the present population is of the permanent sort, composed of industrious, hard-working farmers.

PRINCIPAL CROPS.

Although settlement has been practically at a standstill during the past three years, agricultural development has continued, since most settlers are enlarging their cultivated areas, while many large private land holdings are being subdivided, with the result that a more intensive method of farming is being developed. This brings into favor truck gardening and the growing of potatoes, onions, sugar beets, and the like. The sugar-beet factory established in 1911 stimulates intensive farming, aud it was fully demonstrated last year that the soils are especially adapted to sugar-beet culture.

Notwithstanding the severe water shortage toward the close of the 1912 season, there was a substantial increase in crop production over the 1911 season. The total crop value for 1911 was about $427,000, and for 1912 about $470,000, showing an increase of $43,000, as compared with an increase in 1911 over 1910 of $124,000. Prices were well maintained for all crops except onions and potatoes, of which there was an over-production, with the result that they became a drug on the market, with no sale at prices ranging from $5 to $10 per ton. Alfalfa continues the principal crop, the steady demand for which maintained favorable prices.

Crop statistics, Truckee-Carson project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	12,912	Ton	33,595	$235,165
Alfalfa and grain	3,319	do	820	5,740
Barley	2,259	Bushel	74,792	63,573
Beets, sugar	254	Ton	2,382	13,697
Fruit	189			2,000
Garden	150			15,000
Grain hay	284	Ton	319	2,233
Miscellaneous crops	135			2,700
Oats	399	Bushel	16,875	8,606
Pasture, native grass	15,004			60,016
Potatoes	483	Bushel	65,633	24,612
Wheat	2,484	do	40,600	36,540
Total	37,872			469,882
Less duplicated area	1,252			
Total irrigated	36,620			

ORDER DATED NOVEMBER 14, 1912.

In view of the losses which have been suffered on account of partial failure of the water supply for the Truckee-Carson project, Nevada, in the irrigation season of 1912 the following order is hereby issued in pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), and acts supplementary thereto or amendatory thereof, viz:

No action looking to cancellation of entries or water-right applications under the said project for failure to make payment of the portion of the installment for building the irrigation system due December 1, 1911, shall be taken until December 1, 1913, in any case where 50 cents per acre has been paid on account thereof: *Provided, however*, That this order shall not apply to entries or water-right applications on which two or more installments of the building charge shall remain due and unpaid on November 30, 1912, or upon which any installment for operation and maintenance shall remain due and unpaid on November 30, 1912.

WALTER L. FISHER,
Secretary of the Interior.

PUBLIC NOTICE DATED JANUARY 17, 1913.

On November 14, 1912, an order was issued under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), for the relief of the settlers under the Truckee-Carson project, Nevada, by requiring only partial payment of the installment for building charge due December 1, 1911, the payment of the balance to be made December 1, 1913. Such order is hereby amended so as to read as follows:

The portion of the installment for building the irrigation system due December 1, 1911, on any water-right application is hereby reduced to 50 cents per acre of irrigable land, and the balance of said portion of installment due December 1, 1911, amounting to $1.70 per acre for lands entitled to the $22 rate, or $2.50 per acre for lands to which the $30 rate is applicable, shall be divided into two equal parts and added to the ninth and tenth installments, respectively: *Provided, however*, That this notice shall not apply to entries or water-right applications on which two or more installments of the building charge remained due and unpaid on November 30, 1912, or upon which any portion of an installment for operation and maintenance remained due and unpaid on November 30, 1912.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, Truckee-Carson project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to special fiscal agent		$103.35
Accounts receivable:		
Water rentals	$0.42	
Miscellaneous rentals	369.93	
Miscellaneous	136.91	
Water-right building charges	60,764.94	
Water-right operation and maintenance charges	18,544.19	
		79,816.39

Inventories:			
Mercantile stores		$7,037.77	
Equipment in use—			
Animals	$11,620.84		
Mechanical and other	156,767.30		
		168,388.14	
Materials, supplies, etc., in storehouse		22,284.37	
Cement		2,051.07	
Structural iron and steel		14,037.50	
Lumber		3,776.89	
Explosives		165.45	
Fuel		788.55	
Goods in transit		1,030.84	
Undistributed cost, freight and handling on inventory property		[1] 3,617.57	
			$215,943.01
Improvements to land:			
Gross cost		5,043,903.46	
Less credits from incidental operations—			
Rentals of cottages	3,725.67		
Rentals of grazing lands	10,463.52		
Profits on mess operations	14,810.30		
Profits, mercantile stores	10,406.31		
Profits, hospital	1,000.73		
Profits, miscellaneous	4,338.35		
Adjustments—			
Contractor's freight refund	300.00		
Forfeitures by defaulting bidders and contractors	499.95		
		45,544.83	
			4,998,358.63
Deferred operation and maintenance revenues			146,346.73
Total assets			5,440,568.11

LIABILITIES.

Accounts payable:			
Labor		11,637.58	
Purchases		12,792.65	
Contract estimates		6,943.20	
Contract holdbacks		29.15	
Freight and express		18,222.77	
Passenger fares		285.05	
Land agreements		823.99	
Coupons		233.45	
Meal tickets		163.00	
			51,130.84
For amortization of original cost by repayment—			
Building charges accrued	275,231.07		
Building advance collections	1,931.90		
Building collections forfeited	1,561.80		
		278,724.77	
For depreciation on plant and equipment		63,503.65	
			342,228.42
Unadjusted credits, net earnings of Government animals			17,617.19
Net investment:			
Disbursement vouchers	5,186,556.96		
Disbursement vouchers	5,186,556.96		
		5,427,281.77	
Collection vouchers	364,271.57		
Transfers issued	33,418.54		
		397,690.11	
			5,029,591.66
Total liabilities			5,440,568.11

[1] Deduct.

Feature costs, Truckee-Carson project, to June 30, 1913.

Buildings:		
Headquarters and permanent buildings	$13,858.38	
Ditch tenders' houses	14,932.56	
		$28,790.94
Distribution system:		
Main canals	448,625.72	
Lateral and drainage system	1,365,978.85	
Carson River Channel	131,821.37	
Lower Carson Diversion Dam	91,676.70	
Power-house drop, V line	62,535.46	
		2,100,638.10
Examination of project as a whole:		
Examination, general	43,684.25	
Examination, reservoir sites and storage	54,613.06	
Hydrography	19,411.53	
Topographic survey	55,261.56	
Drainage investigations	2,450.72	
Resurvey and soil examination	2,165.71	
		177,586.83
Experimental farms, building and operation		7,008.44
Storage system:		
Lake Tahoe reservoir and regulating works	15,203.38	
Lahontan reservoir and storage works	862,817.54	
		878,020.92
Main Truckee Canal:		
Earthwork, structures, and repairs, including Truckee Dam	1,575,217.56	
Truckee concrete chute	28,248.54	
		1,603,466.10
Pyramid Lake Canal:		
Preliminary location	2,273.26	
Examination	612.34	
		2,885.60
Real estate:		
Rights of way and land purchased	56,983.61	
Rights of way donation	1,489.62	
		58,473.23
Irrigable lands:		
Farm-unit subdivision	5,062.82	
Section lines, Carson Sink Valley	10,390.75	
Water-right examination	7,078.93	
Property and structure maps	3,103.77	
		25,636.27
Telephone system, construction		42,210.39
Carson Lake drain, preliminary expense		3,707.85
Hydroelectric development:		
Lahontan power plant	82,063.14	
Commercial power system	23,170.32	
		105,233.46
Purchase of water right		8,038.46
Inventory of cost ledger supplies:		
Headquarters shops	86.15	
Automobile operation	76.77	
Corrals	879.65	
Messes	625.44	
Rock excavated from steam-shovel dump	538.86	
		2,206.87
Total building cost		5,043,903.46
Operation and maintenance:		
Operation	116,502.49	
Maintenance	153,291.32	
Operation of commercial power system	3,310.05	
		273,103.86
Total building and operation and maintenance cost		5,317,007.32

Operating revenues and expenses, Truckee-Carson project, to June 30, 1913.

EXPENSES.

Distribution:		
Operation	$116,502.49	
Maintenance	153,291.32	
		$269,793.81
Undistributed expenses		3,310.05
		273,103.86

REVENUES.

Operation and maintenance, accruals	116,616.83
Operation and maintenance, forfeitures	1,185.07
Operation and maintenance, advance payment	288.45
Rental of lands and buildings	165.00
Rental of power and light	3,140.97
Rental of irrigation water	4,780.90
Miscellaneous revenues	579.91
Deferred operation and maintenance revenues	146,346.73
	273,103.86

Estimated cost of contemplated works, Truckee-Carson project.

Feature:	
Buildings	$3,000
Distributing system	10,000
Examination of project as a whole	10,000
Storage system:	
Lake Tahoe Reservoir	100,000
Lahontan Dam and Reservoir	637,000
Real estate	5,000
Irrigable lands (surveys, etc.)	5,000
Telephone system	1,000
Hydroelectric development	15,000
Deep-drainage system	30,000
Total	816,000
Operation and maintenance	62,000
Grand total	878,000

NEW MEXICO, CARLSBAD PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Eddy.

Townships: 18 to 24 S., Rs. 25 to 29 E., New Mexico meridian.

Railroad: Atchison, Topeka & Santa Fe System.

Railroad stations and estimated population, January 1, 1913: Carlsbad, 2,700; Otis, 75; Loving, 150; and Malaga, 75.

WATER SUPPLY.

Source of water supply: Pecos River.

Area of drainage basin: 22,000 square miles.

Annual run-off in acre-feet of Pecos River at Carlsbad and Dayton (22,000 square miles), 1899 to 1912: Maximum, 912,000; minimum, 148,000; mean, 304,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 20,277 acres.

Area under water-right applications, season of 1913: 20,277 acres.

Length of irrigating season: From March to November and two weeks in winter, 260 days.

Average elevation of irrigable area: 3,100 feet above sea level.
Average annual rainfall on irrigable area: 15 inches for 11 years; 12.68 inches for calendar year 1912.
Range of temperature on irrigable area: —3 to 110° F.
Character of soil of irrigable area: Pecos—Sandy loam with large lime content.
Principal products: Alfalfa, cotton, grain crops, grapes, melons, peaches, pears, and miscellaneous fruits.
Principal markets: Carlsbad, N. Mex.; Denver, Colo.; Chicago, Ill.; Kansas City, Mo.; Texas cities; New York, N. Y.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: December 17, 1907; November 30, 1908; June 2, 1909; November 17, 1909; October 7, 1910; March 13, 1911; February 17, 1912.
Location of lands opened: Ts. 21, 22, 23, 24, S., Rs. 26, 27, 28, 29 E., New Mexico meridian.
Irrigable lands opened: 20 277 acres; all in private ownership.
Limit of area of farm units: 160 acres.
Duty of water: 3 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $31 and $45.
Annual operation and maintenance charge: $1 and $1.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers, August 31, 1905.
Construction authorized by Secretary, February 24, 1906.
Canal system of Pecos Irrigation Co. purchased February, 1906.
Black River Canal: Reconstruction completed May, 1906.
First irrigation by Reclamation Service, season of 1907.
Avalon Dam: Reconstruction completed November, 1907. Spillway construction completed July, 1912.
McMillan Reservoir: Reconstructed 1907–1909. Capacity increased during fall and winter 1911–12.
Main canals and distribution system rebuilt, 1906 to 1909.
Project completed, 1912.

IRRIGATION PLAN.

The irrigation plan of the Carlsbad project provides for the storage of water in Lake McMillan, on Pecos River, near Lakewood, N. Mex., and in a storage and distributing reservoir on the same river near Carlsbad, N. Mex., controlled by Avalon Dam, and the diversion of water from Avalon Reservoir into a canal system, watering lands on both sides of Pecos River in the vicinity of Carlsbad. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The construction of the project was completed in 1912, and the principal features are: The Avalon and McMillan earth and rock-fill dams, the former having a concrete core wall; a concrete flume or aqueduct spanning the Pecos River, with 4 arches of 100 feet each; a reenforced concrete siphon 6 feet in diameter and 400 feet long, under Dark Canyon; about 50 miles of canals and laterals (exclusive of sublaterals and ditches); a concrete head-gate structure at each of the dams and 2 tunnels driven through rock, each 21 feet in diameter, lined with concrete, aggregating 200 feet in length, equipped with heavy cylindrical gates, operated by turbines (replacing concrete spillway, equipped with wooden emergency gates; spillway having been closed with concrete). All check-gate, spillway, and head-gate structures on the canals, and all turnouts on the laterals, are of concrete construction.

CONSTRUCTION DURING FISCAL YEAR.

The principal construction for the year consisted of the concreting of approximately 3,400 feet of the main canal through a portion of the gypsum district at the south end of the project. A number of concrete meter boxes, weirs, and concrete farm turnouts have been built.

OPERATION AND MAINTENANCE.

Water was available under the entire system during the season 1913. The area actually irrigated amounted to 13,785 acres scattered throughout the project. The supply of water was ample, and much water was wasted past the project. No accidents occurred in operation, and only the usual canal and lateral cleaning was necessary.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Carlsbad project.

Item.	1909	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	20,267	20,267	20,267	20,277	20,277
Acreage irrigated	12,098	13,153	14,803	13,459	13,785
Number of farms irrigated	250	300	350	345	330
Miles of canal operated	45	45	45	45	45
Water stored (acre-feet)	118,725	118,015	128,254	148,210	72,000
Water diverted (acre-feet)	85,573	93,351	85,100	85,086	42,649
Water delivered to land (acre-feet)	27,830	31,561	33,198	38,764	16,520
Per acre of land irrigated (acre-feet)	2.3	2.4	2.2	2.9	1.3

SETTLEMENT.

A limited number of farms have been sold or traded during the year. Indications are that many of the farmers are well satisfied with crop conditions this season. Many wish to sell part of their holdings in order to properly develop a medium-sized farm, as it has been demonstrated that the greatest successes are on farms varying in size from 40 to 60 acres. The Farmers' Irrigated Land Co., a development and land sales company, has organized a good selling organization and is bringing in prospective land buyers twice each month. The company agrees to plant crops and make improvements during the first year after purchase.

The estimated population of the project towns of Carlsbad, Otis, Loving, and Malaga, N. Mex., is 3,000.

The number of farms for the past four years is as follows: 1910, 461; 1911, 495; 1912, 521; 1913, 522.

Crop statistics, Carlsbad project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	7,190	Tons	10,370	$100,253
Alfalfa seed	2,417	Pounds	329,042	34,089
Alfalfa straw	1,120	Tons	368	1,641
Beans	17	Pounds	6,230	306
Cane	203	Tons	455	2,531
Corn, Indian	338	Bushels	5,611	4,012
Corn, Kafir	1,197	do	26,079	13,475
Cotton	1,250	Bales	500	30,000
Cotton seed	1,250	Tons	250	3,000
Maize, milo	1,056	Bushels	16,896	8,642
Peaches	202	Pounds	181,800	5,454
Miscellaneous	176			4,596
	16,416			
Less duplicated areas	4,787			
Total cropped	11,629			208,999
Other purposes	1,830			
Total irrigated	13,459			

FINANCIAL STATEMENTS.

Assets and liabilities, Carlsbad project, June 30, 1913.

ASSETS.

Accounts receivable:			
Water rentals		$98.50	
Miscellaneous		9.76	
Water rights building charges		64,696.40	
Water rights, operation and maintenance charges		5,115.10	
			$69,919.76
Inventories:			
Equipment in use—			
Animals	$575.00		
Mechanical	5,312.74		
		5,887.74	
Materials, supplies, etc., in storehouse		760.94	
Cement		680.97	
Explosives		45.69	
Forage		139.84	
Fuel		126.39	
			7,641.57
Improvements to land:			
Gross cost		836,705.13	
Less credits from incidental operations—			
Rentals of cottages	578.00		
Rentals of irrigation water	8,163.35		
Revenues, miscellaneous	2,018.48		
		10,759.83	
			825,945.30
Total assets			903,506.63

LIABILITIES.

Accounts payable:			
Labor		628.22	
Purchases		285.55	
Freight and express		356.11	
Passenger fares		77.75	
Miscellaneous		293.00	
			1,640.63
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued		75,136.70	
Building, advance collections		92,717.15	
Building collections forfeited		108.50	
			167,962.35
Unadjusted credits, net earnings of Government animals			983.82
Net investment:			
Disbursement vouchers	933,904.81		
Transfers received	25,735.48		
		959,640.29	
Less—			
Collection vouchers	213,645.50		
Transfers issued	13,084.18		
		226,729.68	
			732,910.61
Excess operation and maintenance			9.22
Total liabilities			903,506.63

Feature costs, Carlsbad project, to June 30, 1913.

Storage works:		
Avalon Dam	$315,505.64	
McMillan Dam	81,393.87	
		$396,899.51
Canal distributing system:		
Main Canal	98,188.66	
Dark Canyon siphon	24,243.76	
East Side Canal	9,436.95	
Flume repairs	17,881.90	
Canal structures	28,965.71	
Black River	7,660.03	
Black River cut-off	17,229.17	
		203,606.18
Lateral distributing system, laterals		40,020.73
Real estate, lands and rights of way		151,904.96
Buildings		3,192.19
Preliminary work		41,081.56
Total building cost		836,705.13
Operation and maintenance:		
Operation	49,733.79	
Maintenance, Avalon Dam	1,191.52	
Maintenance, canal system	20,759.44	
Maintenance, laterals and ditches	24,305.15	
Maintenance, evaporation stations	737.98	
Maintenance, buildings	1,362.79	
Maintenance, experimental farms	1,870.81	
Administrative charges (undistributed)	2,009.63	
Drainage, preliminary	988.29	
Total operation and maintenance cost		102,959.40
Total building and operation and maintenance cost		939,664.53
Less unadjusted credits (to be distributed to features later)		983.82
Total		938,680.71

Operating revenues and expenses, Carlsbad project, June 30, 1913.

EXPENSES.

Distribution:		
Operation	$49,733.79	
Maintenance	50,227.69	
		$99,961.48
Drainage, maintenance		988.29
Undistributed expenses		2,009.63
Excess revenues over costs		9.22
		102,968.62

REVENUES.

Operation and maintenance, accruals	95,996.55
Operation and maintenance, forfeiture	85.95
Operation and maintenance, advance payments	211.55
Rental of lands and buildings	1,588.44
Rental of irrigation water	3,675.81
Miscellaneous revenues	1,410.32
	102,968.62

Estimated cost of contemplated works, Carlsbad project.

50 water meters, for measuring water diverted from Main Canal and from laterals to farms	$750.00
Installation, including concrete structures, 50	2,000.00
40 steel head gates at lateral turnouts on Main Canal	1,200.00

Installation of 20 only	$1,000.00
Construction of approximately 5 miles of new laterals for lands not heretofore irrigated	1,000.00
Construction of two check gates on Main Canal:	
Gates (2)	300 00
Structures (2)	700.00
Construction of approximately 4 miles of closed drains in sections 10, 14, 15, 16, 23, 24, 25, and 26, T. 22 S., R. 27 E	25,000.00
Total	31,950.00

NEW MEXICO, HONDO PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Chaves.
Townships: 11 and 12 S., Rs. 22, 23, and 24 E., New Mexico meridian.
Railroad: Atchison, Topeka & Santa Fe Ry.
Railroad station and estimated population, January 1, 1913: Roswell, N. Mex., 7,000.

WATER SUPPLY.

Source of water supply: Hondo River.
Area of drainage basin: 1,037 square miles.
Annual run-off in acre-feet of Hondo River at the diversion dam (1,037 square miles), 1903 to 1912: Maximum, 90,500; minimum, 2,100; mean, 29,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area under rental contracts season of 1913: 2,305 acres.
Length of irrigating season: From March to November—245 days.
Average elevation of irrigable area: 3,750 feet above sea level.
Average annual rainfall on irrigable area: 17 years, 14.4 inches; 1912, 11.95 inches.
Range of temperature of irrigable area: 0° to 100° F.
Character of soil of irrigable area: Rich alluvium.
Principal products: Alfalfa and fruits.
Principal markets: Roswell, N. Mex.; Kansas City, Mo.; Chicago, Ill.; and Texas cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice; 1,261 acres were irrigated under rental contracts to December 31, 1912, and 722 to June 30, 1913.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers June 6, 1904.
Construction authorized by Secretary September 6, 1904
Hondo Reservoir site purchased December 3, 1904.
Hondo Reservoir and Inlet Canal completed August, 1906.
Distributing canals completed April, 1907.
Project completed May, 1907.

IRRIGATION PLAN.

The irrigation plan of the Hondo project provides for the diversion of water from the Hondo River about 12 miles southwest of Roswell, N. Mex., through a short inlet canal, into a natural storage reservoir, the capacity of which is increased by embankments; the return of stored water to the river, and the diversion of water from the river by three dams, 2, 4, and 6 miles, respectively, below the reservoir, into canal systems watering lands in the vicinity of Roswell, N. Mex. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

All features of this project are completed, and no construction work was in progress during the fiscal year.

OPERATION AND MAINTENANCE.

The water from the Hondo River was diverted directly into the canal system, irrigating 1,261 acres of land during 1912. Considering the adverse conditions existing as to the water supply, the farmers under this project have obtained very good results. Frequent cleaning of the canals was necessary on account of the high percentage of silt carried by the water. Other than this very little maintenance work was necessary.

For " Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Hondo project.

Item.	1909	1910	1911	1912	1913, to June 30.
Acreage irrigated			1,136	1,261	722
Number of farms irrigated		20	19	26	21
Miles of canal operated		12½	12½	12½	12½
Water stored (acre-feet), maximum	1,100	1,200	5,000	3,500	2,300
Water diverted (acre-feet)[1]	2,058	4,225	21,020	13,062	1,323
Water delivered to land (acre-feet)		1,170	1,049	1,640	459
Per acre of land irrigated (acre-feet)		.9	.9	1.3	.6

[1] Water diverted from Hondo River.

SETTLEMENT.

No additional settlers came to the project during the year. The estimated population for the years 1911, 1912, and 1913, using the water-rental contracts signed as a basis, is 80, 85, and 100 persons, respectively. Water-rental contracts for the years 1911, 1912, and 1913, included 24, 26, and 28 farms, respectively.

PRINCIPAL CROPS.

A table is submitted herewith, showing the acreage irrigated, production, and value of the crops for the year 1912:

Crop statistics, Hondo project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	744	Ton	1,333	$14,432
Apples	49	Box	500	375
Beans	½	Pound	600	24
Cane	190	Ton	285	2,796
Corn	64¾	Bushel	2,695	2,103
Maize	109	Ton	228	2,191
Peppers, Chile	1½	Pound	4,000	400
Potatoes, sweet	½	do	6,000	120
Peaches and pears	16	Box	450	450
Vegetables	1			100
Less duplicated	1,176 11			22,991
Total cropped	1,165			
Other purposes	96			
Total irrigated	1,261			

FINANCIAL STATEMENTS.

Assets and liabilities, Hondo project, June 30, 1913.

ASSETS.

Accounts receivable, water rentals			$357.47
Inventories:			
Equipment in use—			
Animals		$150.00	
Mechanical and other		274.00	
			424.00
Improvements to land:			
Gross cost		364,163.80	
Less credits from incidental operations—			
Rentals, irrigation water	$5,713.61		
Revenues, miscellaneous	15.75		
Contractor's freight refunds	159.63		
		5,888.99	
			358,274.81
Total assets			359,056.28

LIABILITIES.

Accounts payable:			
Labor		$126.36	
Purchase		2.75	
Freight and express		2.47	
Passenger fares		11.10	
			142.68
Net investment:			
Disbursement vouchers	$378,071.94		
Transfers received	12,493.16		
		390,565.10	
Less—			
Collection vouchers	30,884.98		
Transfers issued	766.52		
		31,651.50	
			358,913.60
Total liabilities			359,056.28

Feature costs, Hondo project, to June 30, 1913.

Storage works:			
Reservoir and embankment		$96,246.60	
Outlet canal; excavation and embankment		57,772.59	
Protection embankment and outlet canal		825.48	
			$154,844.67
Diversion system:			
Inlet canal; laterals, headworks, and earthworks		58,362.38	
Dam, rock excavation		35,536.31	
Preliminary investigations of water rights and "Diamond A" Canal		2,538.11	
			96,436.80
Distribution system, laterals			38,979.34
Real estate (rights and property), lands purchased			21,599.46
Irrigable lands, farm subdivisions			19,837.41
Buildings:			
Construction		1,738.99	
Maintenance		542.71	
			2,281.70
Telephone line:			
Construction		4,170.42	
Maintenance		102.80	
			4,273.22
Total building cost			338,252.60

Operation and maintenance:		
Operation as a whole	$18,118.58	
Maintenance of inlet canal	1,161.34	
Maintenance of outlet canal	60.92	
Maintenance of reservoir	873.37	
Maintenance of distributing system	5,696.99	
		$25,911.20
Total building and operation and maintenance cost during construction		364,163.80

Estimated cost of contemplated work.—During the fiscal year 1912–13 a survey was made looking toward the construction of a ditch from near the Diamond A ranch to the head of the lateral system for the purpose of conducting water from a point near the Diamond A ranch and delivering it to the distributing system of the Hondo project.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Socorro, Sierra, Dona Ana, N. Mex.; El Paso, Tex.

Townships: 8 to 29 S., Rs. 3 E. to 5 W., New Mexico meridian.

Railroads: Atchison, Topeka & Santa Fe, El Paso & Southwestern, Southern Pacific, and Texas & Pacific.

Railroad stations and estimated population, January 1, 1913: Elephant Butte, 1,500; Engle, 50; Rincon, 230; Selden; Leasburg; Dona Ana, 600; Las Cruces, 4,000; Mesilla Park, 150; Mesquite, 25; Vado; Berino, New Mexico. La Tuna; El Paso, 50,000; and Ysleta, Texas, 500.

WATER SUPPLY.

Source of water supply: Rio Grande.

Area of drainage basin: 37,000 square miles.

Annual run-off in acre-feet of Rio Grande: At San Marcial (30,000 square miles), 1895 to 1912—maximum, 2,420,000; minimum, 201,000; mean, 1,160,000. At El Paso, Tex. (38,600 square miles), 1889 to 1912—maximum, 2,010,000; minimum, 50,700; mean, 947,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: Leasburg unit, 25,000 acres; El Paso Valley, 10,000.

Area under rental contracts, season of 1913: 35,000 acres.

Length of irrigating season: From February 15 to November 15—274 days.

Average elevation of irrigable area: 3,700 feet above sea level.

Average annual rainfall on irrigable area: 9½ inches; 1912, 10.14 inches.

Range of temperature on irrigable area: 0° to 100° F.

Character of soil of irrigable area: Fertile alluvium and sandy loam.

Principal products: Alfalfa, corn, wheat, melons, fruit, and vegetables.

Principal markets: Towns in Texas, New Mexico, Louisiana, and eastern cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands of Leasburg unit and in El Paso Valley are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnoisance and preliminary surveys begun in March, 1903.

Construction of Leasburg unit recommended November 29, 1905.

Construction of Leasburg unit authorized December 2, 1905.

Reclamation act extended to Texas June 12, 1906 (34 Stat., 259).
Treaty with Mexico providing for distribution of waters of the Rio Grande proclaimed January 16, 1907.
Construction of Elephant Butte Dam authorized by Congress and $1,000,000 appropriated March 4, 1907 (34 Stat., 1357).
Leasburg unit completed July, 1908.
First irrigation by Reclamation Service (Leasburg unit), season of 1908.
Construction of Elephant Butte Dam authorized by Secretary May 23, 1910.
Construction plans of Elephant Butte Dam approved by board of engineers June 6, 1910, January 22, 1911, August 12, 1912, January 30, 1913.
Construction plans approved by Secretary October 26, 1910.
Franklin Canal purchased October, 1912.
Elephant Butte Dam 43 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Rio Grande project provides for the storage of flood waters of the Rio Grande in a reservoir controlled by Elephant Butte Dam, about 12 miles west of Engle, N. Mex., and the diversion of water from the Rio Grande, about 6 miles below the storage dam, for the irrigation of lands in Las Palomas Valley; about 24 miles below for watering lands in Rincon Valley; about 60 miles below for the irrigation of 90,000 acres in Mesilla Valley, of which 25,000 acres comprise the Leasburg unit, and about 120 miles below for supplying water to lands in El Paso Valley and furnishing 60,000 acre-feet of water per annum for use on land in El Paso Valley on the Mexican side of the Rio Grande. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

All the irrigation works required for Las Palomas and Rincon Valleys will be new; those for the Leasburg unit include a diversion dam, 6½ miles of canal, and an extension of the existing 25,000-acre canal system to cover all the lands in the Mesilla Valley, and those required for El Paso Valley will supplement and improve present canal systems.

The only features of the above irrigation plan that have been constructed are the diversion dam, headworks, and main canal of the Leasburg unit.

Construction work is in progress on the Elephant Butte Dam and the features remaining for future construction are the canal systems for the Palomas, Rincon, and El Paso Valleys and the extension of the Leasburg unit.

CONSTRUCTION DURING FISCAL YEAR.

Elephant Butte Dam.—All preliminary work, except in connection with the earth embankment, has been finished, and camp buildings have been completed. It has been decided to increase the capacity of the sand-cement grinding plant by the addition of a fourth tube mill. With this exception, all plants are complete that are to be used in connection with the main dam. Studies are being made at the site of the earth embankment to determine the proper character of core wall to be adopted. No further work has been done on the spillway during the year. The flume has been completed and the river was diverted through it on November 6, 1912. Both the upper and lower cofferdams have been closed and brought to safe heights. On November 8, 1912, excavation for the main dam was started with the cableways and grab buckets, working three shifts, and has continued without delay. Until April, 1913, the bulk of the excavation was done by the above means. In April the grab buckets were removed and skips substituted, as all efforts were being directed toward preparing a portion of the foundation for concreting. Concreting was started with one shift on June 3, 1913, and continued until June 30, while excavation has been carried on with three shifts as usual. The channeler was started cutting out the cut-off trench

at the heel of the dam on June 23 and is working two shifts with good progress. The sand-cement plant made a trial run during March and short runs have been made since to test out the plant. It is expected that all plants will be operated; concreting will be carried on with two shifts daily and excavation will be resumed by grab buckets on and after July 1, 1913.

Surveys.—Farm unit and topographic surveys were continued in the Rincon and Mesilla Valleys during 1912. Canal location surveys were made for various routes for high-line and valley canals in these districts, and office work on estimates for the several routes and studies of the drainage and river crossing structures continued in the El Paso and Las Cruces offices.

OPERATION AND MAINTENANCE.

The diversion dam and main canal on the Leasburg unit were operated during the year 1912, supplying water to the three principal community ditches in the Mesilla Valley. The contract between the Government and the Elephant Butte Water Users' Association for the delivery of water through its canal to the intakes of the Las Cruces, Dona Ana, and Mesilla Canals was renewed in February, 1912. Approximately 6 acre-feet of water per acre were supplied to the 25,000 acres receiving water from Leesburg diversion dam.

The Franklin Canal was purchased for $120,000 from the Franklin Irrigation Co. in October, 1912, a valuable right of way being obtained through the city of El Paso and in the valley which would otherwise have been difficult and expensive to secure. The canal from head gate to end is approximately 31 miles. It has 61 check gates, 6 of which are concrete, and 200 turnouts. The capacity is approximately 175 second-feet, and 14,000 acres can be served when the river stage is sufficient. Future plans consider widening the canal with necessary enlargement of the head gates and structures to irrigate approximately 40,000 acres. Operation of the canal was begun in February, 1913, after some cleaning and repairs to structures had been accomplished, and approximately 10,000 acres are being irrigated from this source.

For " Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Rio Grande project.

Item.	1909	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	25,000	25,000	26,000	25,000	35,000
Acreage irrigated	22,000	22,600	25,980	23,115	[2] 34,799
Number of farms irrigated	975	885	885	890	1,488
Miles of canal operated	6	6	6	6	36
Water diverted (acre-feet)	[1] 145,892	[1] 99,789.6	[1] 152,685	[1] 125,000	[3] 124,520
Water delivered to land per acre of land irrigated (acre-feet)	[1] 6.6	[1] 4.4	[1] 6	[1] 5.4	.....

[1] At lateral head gates; service does not distribute water. Does not include scouring and silting water furnished free of charge.
[2] Exclusive of 203 city lots.
[3] Includes water delivered to lateral headgates Leasburg unit and total water diverted Franklin Canal.

SETTLEMENT.

Little extension of the area under cultivation has been made, on account of the limitations of the water supply. The farmers and prospective settlers realize that little dependence can be placed on the supply from the river until the storage dam is completed and the flow regulated. It is expected that stored water will be available in 1915 and the dam completed a year later. While the farming area under cultivation on the entire project has not increased, the principal city and towns have grown considerably in population.

PRINCIPAL CROPS.

About 60 per cent of the irrigated land is planted to alfalfa, 20 per cent to corn, 9 per cent to small grain, and 11 per cent to orchards, vineyards, gardens, and miscellaneous crops. Alfalfa is generally the most successful crop grown and gives the best net returns, although the yield for 1912 was slightly below normal because of river conditions. Considerable fruit was planted, and the crop was remarkably good.

Crop statistics Rio Grande project calendar year 1912 under Leasburg diversion dam.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	16,740	Ton	54,405	$544,050.00
Corn	3,767	Bushel	90,408	63,285.60
Wheat	1,020	do	30,600	22,950.00
Oats	262	do	14,410	7,637.30
Barley	28	do	1,260	1,323.00
Beans	234	Pound	210,600	6,318.00
Sorghum	161	Ton	564	5,640.00
Orchard	445	Pound	1,335,000	33,750.00
Grapes	30	do	144,000	4,320.00
Miscellaneous	428			21,400.00
Total cropped	23,115			710,673.90

In addition to the above acreage there were approximately 57,000 acres irrigated under the project from community canals having temporary river headings.

FINANCIAL STATEMENTS.

Assets and liabilities Elephant Butte storage project, June 30, 1913.

ASSETS.

Cash in special fiscal agent's possession awaiting remittance		$2,775.39
Accounts receivable, miscellaneous		954.01
Inventories:		
Mercantile stores	$29,300.00	
Equipment in use—		
Animals	$7,762.98	
Mechanical and other	168,088.77	
	175,851.75	
Materials, supplies, etc., in storehouse	48,468.98	
Cement	506.48	
Lumber	9,519.68	

Inventories—Continued.			
Explosives		$5,750.16	
Forage		2,445.20	
Fuel		841.49	
Products of local operations		16,370.92	
Goods in transit		1,873.00	
Unadjusted transfer between projects		24,637.57	
Undistributed cost (freight and handling on inventory property)		6,153.99	
			$321,719.22
Improvements to land:			
Gross cost		2,151,737.19	
Less credits from incidental operations—			
Rentals of cottages	[1] $3,235.90		
Power and lights	855.64		
Revenues, miscellaneous	840.72		
Profits on mess operations	988.95		
Profits on mercantile store	25,534.93		
Loss on hospital	[1] 803.95		
Contractor's freight refunds	2,034.09		
Forfeitures by defaulting bidders and contractors	1,463.43		
		27,677.91	
			2,124,059.28
Total assets			2,449,507.90
LIABILITIES.			
Accounts payable:			
Labor		14,937.54	
Purchases		13,779.08	
Contract estimates		249.53	
Freight and express		17,348.95	
Passenger fares		555.73	
Land agreements		12,612.00	
Coupons		373.65	
Miscellaneous		113.60	
			59,970.08
Reserves, for depreciation on plant and equipment			180,139.98
Unadjusted credits, net earnings of Government animals			1,443.15
Net investment:			
Reclamation fund—			
Disbursement vouchers		1,207,981.24	
Transfer vouchers received		113,390.71	
		1,321,371.95	
Less—			
Collection vouchers	97,830.02		
Transfer vouchers issued	14,086.24		
		111,916.26	
			1,209,455.69
Rio Grande Dam appropriation—			
Disbursement vouchers		998,590.78	
Less collection vouchers		91.78	
			998,499.00
Total liabilities			2,449,507.90

Feature costs, Elephant Butte storage unit, to June 30, 1913.

Preliminary:			
Surveys, examinations, and borings		$29,267.27	
Real estate (rights and property), lands submerged		312,871.97	
			$342,139.24

[1] Debit balance.

Preparatory:			
Roads and bridges		$43,091.42	
Buildings		141,128.13	
Plant		778,149.78	
			$962,369.33
Elephant Butte Dam:			
Flume and cofferdams		220,500.13	
Excavation for foundation		361,732.02	
Masonry		205,528.23	
Gates and sluiceways		9,679.77	
			797,440.15
Earth dike			2,194.19
Spillway			22,466.73
Inventory of cost ledger supplies			25,127.55
Total building cost			2,151,737.19

Assets and liabilities, Rio Grande (including Leasburg project), June 30, 1913.

ASSETS.

Inventories:			
Equipment in use—			
Animals	$2,853.05		
Mechanical and other	16,495.30		
		$19,348.35	
Materials, supplies, etc., in storehouse		1,557.72	
Cement		16.00	
			$20,922.07
Improvements to land:			
Gross cost		542,841.65	
Less credits from incidental operations—			
Rentals of cottages	10.00		
Rentals, irrigation water	72,698.90		
Profits on mess operations	[1] 1,729.65		
Adjustments, contractors' freight refunds	2,114.34		
		73,093.59	
			469,748.06
Total assets			490,670.13

LIABILITIES.

Accounts payable:			
Labor		4,593.84	
Purchases		1,315.26	
Freight and express		415.06	
Passenger fares		42.70	
			6,366.86
Reserves for depreciation on plant and equipment			2,026.96
Unadjusted credits, net earnings of Government animals			1,127.22
Net investment:			
Disbursement vouchers	565,989.82		
Transfers received	23,876.20		
		589,866.02	
Less—			
Collection vouchers	90,874.68		
Transfers issued	17,842.25		
		108,716.93	
			481,149.09
Total liabilities			490,670.13

[1] Deduct.

Feature costs Rio Grande project to June 30, 1913.

Preliminary examination:			
Hydrographic survey		$16,939.36	
Topographic surveys and investigations—			
General	$55,477.13		
Soil and cement	1,686.50		
		57,163.63	
Canal surveys—			
Mesilla Valley	59,322.90		
El Paso Valley	9,260.19		
Rincon Valley	19,313.22		
Palomas Valley	3,528.92		
		91,425.23	
			$165,528.22
Franklin Canal:			
Surveys		3,767.56	
Purchase price		125,976.06	
Improvements		2,941.85	
Operation and maintenance		13,685.98	
			146,371.45
LEASBURG UNIT.			
Preliminary examination:			
Surveys		5,776.78	
Real estate (rights and property)		1,556.67	
Irrigable lands, farm units, and subdivision		5,994.62	
			13,328.07
Diversion dam:			
Sluiceway and headworks		8,065.95	
Concrete weir and abutments		73,827.41	
Embankment at west end		4,495.91	
			86,389.27
Main canal:			
Excavation station 0–59		31,030.46	
Excavation and structure station 60–309		43,847.98	
Sand sluiceway		6,749.38	
Change in river channel		13,809.33	
			95,437.15
Buildings and plants:			
Concrete house		3,031.66	
Tool house, stable, corral, bunk house, water tower, fencing, tents, and windmill		2,028.80	
			5,060.46
Telephone system		893.44	
Roads		234.13	
Bridges		398.08	
			1,525.65
Inventory of cost ledger supplies			232.49
Operation and maintenance (during construction):			
Operation			23,266.67
Maintenance—			
Main canal and sluiceway		2,483.23	
Change in river channel		87.00	
Dam, sluice, and head gates		314.00	
Canal structures		313.04	
Flood protection		201.75	
Buildings and plants		2,142.95	
Headquarters grounds		160.25	
			5,702.22
Total building and operation maintenance (during construction)			542,841.65

Estimated cost of contemplated works, Rio Grande project.

Wagon roads	$9,000
Flume and cofferdams	3,000
Excavation for foundation of dam	347,000
Masonry for dam	1,129,000
Gates and sluice gates	82,000
Spillway	3,000
Earth dam at reservoir	155,000
Real estate	37,000
Construction plants	14,000
Camp buildings and grounds	2,000
Total	1,781,000

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Williams.

Townships: 152 to 155 N., Rs. 100 to 104 W., fifth principal meridian.

Railroad: Great Northern.

Railroad stations and estimated population, January 1, 1913: Buford, Trenton, and Marley, on Buford-Trenton unit, are small unincorporated villages, population not available. Williston, on the Williston unit, is an incorporated city of about 4,000 population.

WATER SUPPLY.

Source of water supply: Missouri River.

Area of drainage basin: 155,000 square miles.

Mean run-off of Missouri River, near Williston, May to October, 1905 to 1907: 15,000,000 acre-feet.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: Buford-Trenton unit, 4,049 acres; Williston unit, 8,189 acres.

Area irrigated, season of 1912: 323 acres on Williston unit. No part of the Buford-Trenton unit was irrigated. Area irrigated in 1913, to June 30, 1,386 acres.

Length of irrigation season: June 15 to September 3, 80 days. Actual irrigation occurred in 1912 only during a period from July 21 to August 31.

Average elevation of irrigable area: 1,900 feet above sea level.

Average annual rainfall on irrigable area (past 10 years), 13.10 inches; at Williston, 1912, 16.33 inches.

Range of temperature on irrigable area: —49° to 107° F.

Character of irrigable area ranges from sandy loam to heavy clay gumbo.

Principal products: Alfalfa, grain, and vegetables.

Principal markets: Local, St. Paul, Minneapolis, Duluth, and Chicago.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Buford-Trenton unit, April 8, 1908; March 9, 1911; May 13, 1911; and June 25, 1912. Williston unit, April 27 and November 30, 1908; April 30, 1909; March 9 and April 14, 1911; June 25, 1912; March 11, 1913; June 23, 1913; and July 21, 1913.

Location of lands opened: Buford-Trenton unit, Ts. 152 and 153 N., Rs. 103 and 104 W., fifth principal meridian; Williston unit, Ts. 154 and 155 N., Rs. 100 and 101 W., fifth principal meridian.

Present status of irrigable lands: Buford-Trenton unit—288 acres entered subject to reclamation act; 251 acres open to entry; 91 acres of State lands; 3,420 acres in private ownership. Williston unit—54 acres entered subject to the recla-

mation act; 289 acres open to entry; 67 acres of State land; 7,779 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $38 under public notices of 1908.

Annual operation and maintenance charge: 70 cents per acre of irrigable land and 50 cents per acre-foot of water actually used, under public notices of 1908; $1.50 per acre of irrigable land and $1 per acre-foot of water used under order of May 13, 1911.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers September 22, 1905.

Construction authorized by Secretary January 23, 1906.

First division, Buford-Trenton unit, completed November, 1907.

Power and pumping plants, Williston unit, completed for present use in the fall of 1907; first division completed in the spring of 1908.

Pumping plant and transmission lines, Buford-Trenton unit, completed for present use in the spring of 1908.

First irrigation by Reclamation Service, season of 1908.

Power installation completed for 2,000 horsepower June 30, 1910.

Buford-Trenton unit 38 per cent completed June 30, 1913; Williston unit 64 per cent completed June 30, 1913.

Entire project 50 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the North Dakota Pumping project provides for a central steam turbine power plant located near Williston, operating pumps and generating electricity for the operation of other pumps on the Buford-Trenton and Williston units. On the Buford-Trenton unit water is pumped from a barge into a settling basin 30 feet above the river, and is then lifted by a permanent pumping station into a canal 50 feet above the settling basin for the irrigation of bench lands near Buford. A transmission line 28.3 miles in length delivers power for the operation of the pumps. The plan of the Williston unit provides for a series of motor-driven centrifugal pumps on a barge in the Missouri River; a settling basin receiving the water from the barge, and a main canal of 90 second-feet capacity extending along Little Muddy Creek to the power plant, where two sets of steam-driven turbines operate centrifugal pumps to lift water 51 feet into E Canal. From the main canal, about midway between the river and the power plant, electrically driven pumps raise 35 second-feet 28 feet into B Canal, and from this canal 20 second-feet are raised an additional 28 feet into C Canal. The main power station is located close to a 9-foot vein of lignite coal, from which fuel is obtained.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The central power station, coal mine, and transmission lines; at Buford-Trenton unit, two pumping stations, settling basin, and canal system; at Williston unit, four pumping stations, two settling basins, and canal system. No construction work is in progress at the present time. Features remaining for future construction are: The enlargement of the power house and installation of additional machinery; at Buford-Trenton unit, extension of Highline Canal and construction of Lowline Canal and laterals for irrigation of bottom lands; at Williston unit, construction of east and west bottom canal systems, with additional intake and pumping stations.

OPERATION AND MAINTENANCE.

During the irrigation season of 1912, subsequent to June 30, the power plant, coal mine, transmission line, the Williston barge pumping station, two permanent pumping substations, settling basin, and

18.4 miles of canals were operated. No features of the Bufort-Trenton unit were operated. Abundant rainfall, distributed evenly throughout the growing season of 1912, had the effect of postponing compliance with the terms necessary to secure irrigation, and it was not until July 21 that water was pumped into the canals for irrigation. On the Williston unit, 16 farms were irrigated and 4 small agricultural tracts not classed as farms. The total acreage irrigated was 323, and the amount of water actually applied to the land 278 acre-feet. During the pumping season of 1912, 1,126.35 tons of coal were mined at an average cost of $1.97 per ton for operation, and 36 cents per ton for maintenance; total average cost per ton, $2.33. The maintenance costs were large, due to the necessity of maintaining a nucleus of an organization which was engaged upon needed maintenance and development.

For " Summary of operation and maintenance results," see Appendix, p. 334.

On October 16, 1912, a contract was executed with the city of Williston whereby power in excess of the requirements of the project is furnished to the city for municipal purposes. The terms of the contract are mutually favorable. The city was unable to make the necessary extensions to its plant to meet the increasing requirements and the service will be enabled to operate the power plant continuously, thus having always available a nucleus of operating force to be augmented in accordance with the demands of the irrigation season. The conditions were peculiarly favorable to this contract inasmuch as the city load is heaviest when the irrigation load is lightest. A further advantage is the continuous operation of the coal mine, and a resulting longer life of timbers and track and a reduction of maintenance cost. During the last three months of the year necessary changes were made in the power-plant building to adapt it to winter operation. A snowshed was built over the mine track and a well and water softening apparatus installed. All of these charges are prorated monthly to the contract, in addition to the current cost of operation. Current was first delivered to the city December 20, 1912, and the results of operation by months to the close of the fiscal year are as follows:

Month.	Cost.	Revenue.	Gain.
December	677.88	667.76	[1] 10.12
January	1,554.19	1,582.56	28.37
February	1,373.01	1,500.00	126.99
March	1,547.99	1,500.00	[1] 47.99
April	1,739.55	1,500.00	[1] 239.55
May	1,807.03	1,500.00	[1] 307.03
June	522.34	1,022.63	500.29
	9,221.99	9,272.95	50.96

[1] Deficit for month.

As the city's distributing system is improved and certain proposed additions are made to its electrical equipment, it is expected that the revenue will be largely increased while the operating cost will remain practically stationary.

The irrigation season of 1913 began on June 5, and up to the end of the fiscal year 2,260.82 acre-feet of water were pumped and delivered to 1,386 acres of land which were actually irrigated. Before the close of the season these figures will doubtless be largely increased:

Historical review, North Dakota Pumping project.

WILLISTON UNIT.

	1909	1910	1911	1912	1913 (to June 30).
Acreage for which service was prepared to supply water	8,189.31	8,189.31	8,189.31	8,189.31	8,189.31
Acreage irrigated	1,450.00	1,403.00	2,426.00	323.00	1,386.00
Number of farms irrigated	45	43	77	16	50
Miles of canal operated	28	32	37	18	31
Water diverted (acre-feet)	3,912.10	4,765.74	4,299.70	750.32	2,260.82
Water delivered to land (acre-feet)	2,225.00	2,379.00	2,952.00	278.00	1,310.20
Water per acre of land irrigated (acre-feet)	1.54	1.69	1.22	0.86	0.945

BUFORD-TRENTON UNIT.

Acreage for which service was prepared to supply water	4,049.00	4,049.00	4,049.00	4,049.00	4,049.00
Acres irrigated	159.00	457.00	1,163.00	.....	.....
Number of farms irrigated	3	10	21	.....	.....
Miles of canal operated	6.5	8.0	12.75	.....	.....
Water delivered to land (acre-feet)	232.00	662.00	1,472.00	.....	.....
Water per acre of land irrigated (acre-feet)	1.46	1.45	1.27	.....	.....

SETTLEMENT.

The settlement of both units of the project is practically stationary and unchanged. This is due to lack of initiative and effort on the part of the owners of private lands; to drought, hail, or other causes which have deprived farmers of nonirrigable lands of money with which to pay for irrigable lands; and to the failure of farmers of irrigable lands to reduce their acreage, to farm intensively and in accordance with good irrigation practice. Of the acreage irrigated in the season of 1913 to June 30, 54 per cent is owned by persons not resident upon the land; 37 per cent of the owners are business men living in the city of Williston, and an additional 10 per cent are nonresident persons not business men who depend upon employing farmers in the neighborhood to cultivate, irrigate, and harvest their crops, with the result that returns are unsatisfactory both to the owner and to the farmer who does the work. The greatest needs of the project are the reduction of individual holdings and the actual residence of owners upon their lands. The population of the project has been as follows: Williston unit—1910, 140; 1911, 136; 1912, 172; 1913, 212. Buford-Trenton unit—1910, 80; 1911, 25; 1912, 53; 1913, 80.

PRINCIPAL CROPS.

The principal crop of the irrigated lands is alfalfa, which has shown a marked increase in acreage since the opening of the project.

Crop statistics, North Dakota Pumping project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Wheat	1,416	Bushel..	36,184	$26,505.25
Oats	924	...do.....	43,841	10,506.77
Barley	445	...do.....	16,035	4,810.50
Flax	396	...do.....	5,541	6,098.94
Potatoes	162	...do.....	22,513	5,410.25
Wild hay	1,194	Ton.....	1,036	9,964.00
Alfalfa, old	1,430	...do.....	2,308	23,080.00
Alfalfa, new	[1] 173	...do.....	12	120.00
Corn fodder	69	...do.....	424	2,120.00
Cabbage	4	...do.....	40	800.00
Miscellaneous truck	35	.....	.....	3,950.00
Less duplicated area	309	.....	.....	.....
Total cropped	5,939	.....	.....	93,365.71

[1] Only 12 acres cut.

PUBLIC NOTICE DATED MARCH 11, 1913.

Whereas in pursuance of the order of April 14, 1911, water was furnished in the season of 1911 to lands in the Williston project, North Dakota, constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388); and

Whereas the said order was modified by the order of June 25, 1912, providing for extension of time of payments, under conditions therein set forth; and

Whereas under the provisions of the above orders landholders were required to make payments on account of operation and maintenance on a total of 4,000 acres before the barge would be launched in 1913, and also to pay such sums as may have accrued on account of operation and maintenance in the years 1911 and 1912;

Now, therefore, in pursuance of the provisions of the said reclamation act and acts amendatory thereof and supplemental thereto, public notice is hereby issued, as follows:

1. Water will be delivered in 1913 to any landholder under existing canals and laterals who was entitled to receive water in 1911 or in 1912, and who shall have paid all charges for those years, provided said landholder complies with the conditions governing water-right applications and payments for the year 1913, as hereinafter set forth.

2. Water will be delivered to any other holder of irrigable land under existing canals and laterals who shall comply with the terms of this order.

3. Water will be furnished to all public land farm units and lands in private ownership which remain subject to the former announced building charge of $38 per acre, and are not subject to cancellation for failure to make two payments when due. For any such lands for which entries or applications are subject to cancellation, water may be obtained under the provisions of this order.

4. The charges for building, operation, and maintenance are divided into two parts as follows:

(*a*) For building, at the rate to be hereafter announced. The portion for the first installment shall be 50 cents per acre of irrigable land.

(*b*) For operation and maintenance $1 per acre of irrigable land per annum until further notice, plus $1 per acre-foot for water delivered.

5. The first installment of the charges for building, operation, and maintenance shall be due on April 1, 1913, and no water will be furnished in 1913 until the portion for building charge, 50 cents per acre, has been paid. The portion for operation and maintenance, including the charge per acre-foot, must be paid before water is furnished in 1914.

6. No water shall be delivered in 1913 except to land covered by a recorded water-right application. New water-right applications may be made at the office of the project manager, Williston, N. Dak., and all payments shall be made to the special fiscal agent of the Reclamation Service at Williston, N. Dak. New water-right applications filed hereunder shall be so modified as to state that the charge per acre to be paid by the applicant shall be as hereafter announced.

7. Each holder of lands under this project shall pay the charges for building and betterment, operation and maintenance, when announced, on the entire irrigable area of his land as shown on approved farm unit plats.

8. The operation of the pumps will be planned with a view to an approximately uniform rate of delivery of water and for adequate irrigation in the shortest practicable operating period, namely, for an irrigation season of 80 days beginning not earlier than June 1 and not later than June 15 and closing not earlier than August 19 and not later than August 30 of each year, and a water supply during each season of 2 acre-feet of water for each acre of land irrigated and cultivated, or so much thereof as the water users may require.

9. Landholders who take advantage of these conditions shall be subject to the terms of public notices to be issued hereafter, which shall provide for an increased building charge, the amount of which can not be stated at this time.

10. Former public notices and orders shall remain in full force and effect except as herein modified.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

The undersigned, owner or holder of_____
Sec_____, T_____, R_____, containing_____
irrigable acres, in the Williston project, has read the foregoing notice and agrees to comply with the requirements thereof.
_____, Witness. _____

FINANCIAL STATEMENTS.

Assets and liabilities, North Dakota Pumping project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to S. F. A_____		$12.50
Accounts receivable:		
W. R. building charge_____	$74,351.87	
W. R. O. & M. charge_____	27,073.56	
		101,425.43

Inventories:			
Mercantile stores		$427.12	
Equipment in use—			
Animals	$740.83		
Mechanical, etc	8,976.87		
		9,717.70	
Materials and supplies in storehouse		3,000.48	
Structural iron and steel		380.16	
Forage		386.97	
Fuel		300.17	
Products of local operations		53.32	
Undistributed cost (freight and handling), inventory property		117.05	
			$14,382.97
Improvements to lands:			
Gross cost		712,856.78	
Less credits for incidental operations—			
Rentals of cottages	347.16		
Rentals of irrigation water	196.75		
Profits on mess operations	250.83		
Profits on mercantile store	1,106.22		
Contractors' freight refunds	5,495.08		
		7,396.04	
			705,460.74
Deferred operation and maintenance revenues			183,555.19
Total assets			1,004,836.83

LIABILITIES.

Accounts payable:			
Labor		11.34	
Purchases		1,830.62	
Freight and express		687.94	
Passenger fares		73.60	
Coupons		21.55	
			2,625.05
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	80,214.50		
Advance collections	38.00		
		80,252.50	
For depreciation on plant and equipment		10,229.56	
			90,482.06
Unadjusted credits:			
Net earnings of Government animals			523.75
Net investment:			
Disbursement vouchers	937,590.26		
Transfers received	189,635.65		
		1,127,225.91	
Less—			
Collection vouchers and refunds	33,381.30		
Transfers issued	182,638.64		
		216,019.94	
			911,205.97
Total liabilities			1,004,836.83

Feature costs North Dakota Pumping project to June 30, 1913.

Williston unit:			
Coal mine development			$12,685.98
Williston power plant—			
Power plant		$157,628.63	
Transformer station at barge		2,446.22	
			160,074.85

Williston unit—Continued.		
Pumping station A		$12,550.36
Williston barge	$35,354.27	
Floating boom at barge	691.04	
Scow pontoon	1,256.27	
		37,301.58
Pumping substation B		7,386.45
Transmission and telephone line		14,657.04
Williston canal and basin—		
Distributing system	122,595.65	
Equalizing reservoir	1,071.87	
Spillway at reservoir	502.08	
Turnout at reservoir	217.00	
Diverting structure at reservoir	565.34	
Sluicing boat	763.32	
Bank protection at settling basin	103.58	
Bank revetment, Missouri River	1,598.63	
		127,417.47
Buildings, detached		11,470.16
Real estate		4,676.52
Irrigable lands, surveys, and town sites		8,378.18
Examination of project as a whole		22,541.64
Administration of project as a whole		38,742.46
Total building cost		457,882.69
Buford-Trenton unit:		
Power plant——		
Extension of Williston power house—		
Excavation	977.63	
Concrete work	8,804.57	
Reinforcing steelwork	180.90	
Structural steelwork	686.10	
Roofing work	1,324.65	
Millwork	521.60	
Water conduits	1,048.55	
Installation and testing machinery	54,692.65	
Temporary end in boiler room	387.89	
		68,624.54
Buford-Trenton barge	32,899.38	
Boom and scow pontoon	705.81	
		33,605.19
Buford-Trenton substation A		32,484.77
Transmission and telephone line		22,794.39
Buford-Trenton canal and basin—		
Settling basin	6,698.08	
Brush mattress settling basin	117.42	
Concrete pressure pipe	19,624.92	
Canals and structures	23,207.87	
Canal B	2,181.89	
Sixmile flume	713.05	
		52,543.23
Buildings		4,429.77
Real estate		943.73
Irrigable lands, surveys, and town sites		5,877.24
Examination of project as a whole		6,216.23
Administration of project as a whole		27,455.00
Total building cost		254,974.09
Operation and maintenance:		
Williston unit—		
General expense (undistributed)	2,011.93	
Coal mine	4,532.47	
Power plant	83,615.50	
Power plant camp maintenance	1,014.34	
Pumping substation A	3,381.56	
Barge	22,115.90	
Pumping substation B	2,368.10	

Operation and maintenance—Continued.		
Williston unit—Continued.		
Transmission and telephone line	$1,961.99	
Canal system and basin	17,408.74	
Buildings detached	1,530.10	
Power contract, city of Williston, preparatory	10,985.03	
Power contract, city of Williston, operative	9,221.99	
Inventory of cost ledger supplies	168.38	
		$160,316.03
Buford-Trenton unit—		
Barge	25,813.39	
Substation A	30,815.52	
Transmission and telephone line	6,323.45	
Canal system and basin	7,739.12	
Buildings, detached	140.97	
Total operation and maintenance cost		70,832.45
Recapitulation:		
Building cost, Williston unit	457,882.69	
Building cost, Buford-Trenton unit	254,974.09	
		712,856.78
Operation and maintenance cost, Williston unit	160,316.03	
Operation and maintenance cost, Buford-Trenton unit	70,832.45	
		231,148.48
Total building and operation and maitenance cost		944,005.26

Operating revenues and expenses, North Dakota Pumping project.

EXPENSES.

Williston unit, undistributed expenses		$160,316.03
Buford-Trenton unit, undistributed expenses		70,832.45
Total expenses		231,148.48

REVENUES.

Williston unit:		
Operation and maintenance, accruals	$28,481.65	
Operation and maintenance, forfeitures	26.25	
Operation and maintenance, advance payments	.95	
Rental of lands and buildings	459.44	
Rental of power and light	8,250.32	
Miscellaneous revenues	92.37	
Deferred operation and maintenance revenues	123,005.05	
		160,316.03
Buford-Trenton unit:		
Operation and maintenance, accruals	10,002.31	
Rental of lands and buildings	280.00	
Deferred revenues	123,005.05	
		70,832.45
Total revenues		231,148.48

Estimated cost of contemplated works.—No construction work is contemplated. All authorized expenditures are in connection with the operation and maintenance of the project.

OREGON, CENTRAL OREGON PROJECTS.

IRRIGATION PLAN.

The Central Oregon projects consist of a number of possible irrigation developments in the State of Oregon, located in the Deschutes, Snake, and Columbia River Basins and in the interior basin. The irrigation plan of these projects provides in general for utilization of the waters of various small streams in these drainage basins.

INVESTIGATIONS.

A reconnoissance was made in 1903 of some of the streams and irrigable areas of these projects, and stream measurements and investigations of water supply have been carried on since that date.

In 1908 a reconnoissance, covering in part projects previously reported on but much more complete and thorough than investigations previously attempted, was made in central and eastern Oregon. Irrigation projects on Crooked, Ochoco, Tumalo, and Rosland Rivers, in the Deschutes River Basin; on the Chewaucan, Ana, Pauline, Rock Fort, Silvies, and Blitzen Rivers, and Silver Creek, in the interior basin; on Powder River, in the Snake River Basin; and on the John Day and Umatilla Rivers, in the Columbia River Basin, were investigated with considerable care; and new gauging stations were established along the more important streams.

Cooperative work.—The Legislature of the State of Oregon, by act of February 21, 1913, provided for the making of detail surveys and investigations of the water resources of the State in cooperation with the Federal Government, and appropriated $50,000 for the work, conditional on a like amount being provided by the Federal Government. Such an allotment was subsequently made by the Secretary of the Interior from the reclamation fund, and on February 27 a preliminary agreement was entered into by the Secretary of the Interior on behalf of the United States and by the State engineer for Oregon on behalf of the State, the agreement being also approved by the governor of Oregon, fixing in general terms the plan of operation and the field of investigation and placing the work under the direction of the Reclamation Service. This agreement was followed by a subsequent agreement of May 5, under which the work is now being conducted. Under the terms of this agreement the investigation of the Deschutes River Basin was particularly required to be investigated, and the preliminary work of organization was begun on April 1. Active field work was not taken up until the latter part of May.

The irrigation project suggested in the Deschutes Basin contemplates the storage of approximately 700,000 acre-feet of water by means of a dam at Benham Falls and the irrigation of three large units of land. The first or south unit lies east of Benham Falls and south and west of Crooked River; the second or west unit lies west of the Deschutes River, and would cover part of the Tumalo project now being constructed by the State under direct appropriation; the third, or north, unit lies north of Crooked River. The total irrigable area has been estimated at between 200,000 and 300,000 acres. Test borings are being made at the proposed dam site and surveys started to determine areas of irrigable land in the units described and preliminary estimates of cost. No investigations for other projects have yet been taken up.

OREGON, UMATILLA PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Umatilla.

Townships: 4 and 5 N., Rs. 28 and 29 E., Willamette meridian.

Railroads: Oregon-Washington Railroad & Navigation Co.; Northern Pacific.

Railroad stations and estimated population January 1, 1913: Hermiston, 600; Umatilla, 200.

WATER SUPPLY.

Source of water supply: Umatilla River.
Area of drainage basin: 1,610 square miles.
Annual run-off in acre-feet of Umatilla River at Yoakum: (1,200 square miles) 1903 to 1912—Maximum, 723,000; minimum, 250,000; mean, 500,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1913: 18,300 acres.
Area under water-right applications, season of 1913: 13,947 acres.
Length of irrigation season: From March 20 to October 16—210 days.
Average elevation of irrigable area: 470 feet above sea level.
Average annual rainfall on irrigable area: 6.44 inches; 1912, 9.19 inches.
Range of temperature on irrigable area: —28° F. to 115° F. (ordinary minimum 0° F.).
Character of soil irrigable area: Sandy loam and volcanic ash.
Principal products: Alfalfa, fruits, berries, vegetables.
Principal markets: Portland, Oreg., and Spokane, Wash.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 27, 1907; August 3, 1908; November 12, 1908; April 3, 1909; January 6, 1910 (two); February 28, 1911; May 16, 1911; March 2, 1912; May 8, 1912; March 3, 1913; April 17, 1913; June 23, 1913.
Location of lands opened: Ts. 4 and 5 N., Rs. 28 and 29 E., Willamette meridian.
Present status of irrigable area opened: 8,300 acres entered subject to reclamation act; 156 acres open to entry; 217 acres withdrawn from entry; 8,806.5 acres private lands.
Limit of area of farm units: Public, 40 acres; private, 160 acres.
Duty of water: 2.8 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $60 and $70.
Annual operation and maintenance charge: $1.30 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1905.
Construction recommended by board of engineers October 27, 1905.
Construction authorized by Secretary December 4, 1905.
Diversion dam and feed canal completed August, 1907.
Cold Springs Dam completed June, 1908.
Hermiston unit completed June, 1908.
Maxwell Canal system purchased June 4, 1908.
First irrigation by Reclamation Service, season of 1908.
Cold Springs Reservoir filled to maximum capacity May 1, 1911.
Entire project 84.1 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Umatilla project provides for the diversion of water from the Umatilla River above Echo, Oreg., through a feed canal 24.5 miles long into a storage reservoir controlled by Cold Springs Dam. Water is diverted from the reservoir through an outlet canal; from the feed canal by means of a by-pass connecting the feed and outlet canals, and from the Umatilla River by the Maxwell Canal, heading near Butter Creek, into a distribution system watering land in the Umatilla and Columbia River Valleys near Hermiston, Oreg. The United States intends, for and in connection with the project, to use the waste, seepage, spring and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law, heretofore made for the purposes of the project.

The features which have been completed are: The diversion works, feed canal, Cold Springs Dam, by-pass, diversion works for Maxwell Canal, main distributary, laterals for the first, second, third, and fourth units; also distributary

for the Umatilla unit to which water is being supplied on a rental basis. Four drain ditches have been built. The main construction work in progress is the placing of mortar lining in the distribution system and additional lining in the feed canal.

CONSTRUCTION DURING FISCAL YEAR.

Feed canal.—Four thousand six hundred and fifty linear feet of side lining were placed in the canal, mainly in Foster Flat. The total length of full mortar lining in the feed canal to June 30, 1913, was 8,800 linear feet; total side and bottom lining, 188 linear feet; and total length of side lining, 14,980 linear feet.

Distribution system.—The irrigable area was extended by making water available on a rental basis for about 1,150 acres near Umatilla. This involved the construction of about 2 miles of main lateral, largely in rock, also 2 minor distributaries. Considerable mortar lining was placed in the distribution system. Fifty-six thousand linear feet of distributaries were lined either wholly or in part, and 58,500 square yards, or 2,430 cubic yards of mortar lining were placed. During the year 2,240 linear feet of 20-inch, 4,500 linear feet of 16-inch, and 180 linear feet of 12-inch cement pipe were laid. Eighty concrete turnouts were cast in the yard and assembled in the field. New diversion works were built for the Maxwell Canal. The Hermiston drain was deepened and enlarged where it crosses the railroad right of way and the Umatilla drain was excavated, these items involving the removal of about 47,000 cubic yards of material.

OPERATION AND MAINTENANCE.

Diversion of water for the feed canal was resumed November 11, 1912, and was continued to June 22, 1913, 57,200 acre-feet being diverted from the river, and 49,400 acre-feet reaching the reservoir. No effort was made to fill the reservoir. Storage in excess of 47,000 acre-feet was reached early in April, after which date sufficient water was diverted to equal the draft on the reservoir and losses. A maximum storage of 48,000 acre-feet was reached in May. The available storage on June 30, 1913, was 43,200 acre-feet. Delivery of water through the distribution system began on March 25. The total discharge from the reservoir up to June 30 was 21,200 acre-feet. Delivery of water to the Maxwell Canal also commenced on March 25, the total diversion to June 30 amounting to 7,800 acre-feet. The area of irrigated holdings during the present season is estimated at 10,000 acres and the area actually irrigated at 5,000 acres.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Umatilla project.

Item.	1909	1910	1911	1912	1913 to June 30.
Acreage for which service was prepared to supply water	11,395	15,276	17,252	17,252	18,300
Acreage irrigated	2,000	2,500	3,500	4,600	5,000
Number of holdings irrigated	140	208	242	259	300
Miles of canal operated	90	112	112	112	112
Water stored (acre-feet) maximum	27,000	43,000	50,000	50,000	48,000
Water diverted (acre-feet)	67,000	69,400	78,900	90,000	.....
Water delivered to land (acre-feet)	16,000	25,600	34,100	38,000	.....
Per acre of land irrigated (acre-feet)	8.0	10.2	9.7	8.2	.....

SETTLEMENT.

The total population of the project was 1,250 in 1912, of which about one-half lived within the corporate limits of the city of Hermiston, Oreg. Settlement has advanced slowly. There are 7 tracts of unentered public land in the second unit totaling 116 acres, and 2 tracts of Nothern Pacific land totaling 52 acres, not covered by water-right applications. There has been little progress in the sale of Maxwell land, fully 2,000 acres not being covered by water-right applications. The estimated value of buildings and other improvements is $538,000 and the estimated value added to the land through cultivation $298,000.

PRINCIPAL CROPS.

The alfalfa crop was rather light, owing to a short first cutting. Berries of all kinds did well, and after supplying the local market a small quantity was shipped. A few trees of apples, apricots, and peaches were mature enough to bear, although many of the fruit buds were winterkilled. Watermelons, grapes, onions, and potatoes showed satisfactory yields, but the returns were disappointing owing to low prices and inadequate market facilities. There was a fair increase in the area of all crops. The area in orchard made the greatest growth, increasing nearly 80 per cent. The total value of crop products is estimated at $77,000.

Crop statistics, Umatilla project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	2,442	Ton	8,388	$58,716
Artichokes	6	do	25	500
Berries	26	Pound	22,600	2,599
Clover	34	Ton	36	252
Corn fodder	38	do	57	342
Garden	328	do	48	960
Grapes	52	Pound	26,000	1,040
Melons	18	do	352,000	1,760
Onions	4	Ton	54	1,080
Potatoes	94	do	553	8,295
Rye hay	626	do	335	1,675
Less duplicated areas	450			
Total cropped	3,218			77,219
Other purposes	1,382			
Total irrigated	4,600			

WEST EXTENSION.

Recommendation was made in the early part of 1913 that construction be formally authorized subject to the issuance of an order from the Federal court definitely pledging the holdings of the Oregon Land & Water Co. Necessary authority has not yet been given, but an allotment of $6,000 was made for further investigations of the proposed diversion site, final location of the main canal, and exploration for material for construction. This work was completed in May and the force disbanded. Agreements to sell have been secured for all

rights of way needed at the proposed diversion site with the exception of a small marginal strip owned by J. Frank Watson. Further work is being held in abeyance pending formal approval of construction by the Secretary.

PUBLIC NOTICE DATED MARCH 3, 1913.

On March 2, 1912, public notice was issued under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), for the relief of water-right applicants under the Umatilla project, Oregon, announcing the rates at which water-right applications would be accepted as amendatory to water-right applications theretofore filed and at which new entries and water-right applications shall be made.

The schedule of installments of water-right charges due contained in paragraph 2 of the said public notice is hereby amended so as to read as follows:

Installments due.	First unit.		Second unit.		Third unit.[1]		Fourth unit.	
	Now subject to entry or entered under reclamation act.	Other lands.	Now subject to entry or entered under reclamation act.	Other lands.	Now subject to entry or entered under reclamation act.	Other lands.	Now subject to entry or entered under reclamation act.	Other lands.
Dec. 1, 1908	$6.00	$6.00						
Dec. 1, 1909	6.00	6.00	$6.00	$6.00				
Dec. 1, 1910	2.00	2.00	2.00	2.00	$2.00	$2.00		
Mar. 1, 1912	3.50	3.50	3.50	3.50	3.00	3.00	$2.00	$2.00
Mar. 1, 1913	5.00	5.00	4.50	4.50	4.00	4.00	3.00	3.00
Mar. 1, 1914	7.50	7.50	6.00	6.00	5.50	5.50	4.00	4.00
Mar. 1, 1915	10.00	10.00	8.00	8.00	7.00	7.00	5.50	5.50
Mar. 1, 1916	10.00	10.00	10.00	10.00	8.50	8.50	7.00	7.00
Mar. 1, 1917	10.00	10.00	10.00	10.00	10.00	10.00	8.50	8.50
Mar. 1, 1918	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Mar. 1, 1919			10.00	10.00	10.00	10.00	10.00	10.00
Mar. 1, 1920					10.00	10.00	10.00	10.00
Mar. 1, 1921							10.00	10.00
Total	70.00	70.00	70.00	70.00	70.00	70.00	70.00	70.00

[1] Includes portions of farm units described in special public notice for T. 4 N., R. 28 E., W. M., dated January 6, 1910.

Such part of the portion of the installment account of building charges as has been paid on the basis of the schedule of installments due contained in the public notice of March 2, 1912, which is in excess of the portion of installment account of the building charge due under the schedule herein contained shall be applied as a credit on subsequent installments of such charges.

All future payments of charges as herein provided shall be made to the special fiscal agent of the United States Reclamation Service assigned to the Umatilla project.

Except as herein specifically amended and modified, the terms of the public notice of March 2, 1912, shall remain and be in full force and effect.

SAMUEL ADAMS,
First Assistant Secretary.

PUBLIC NOTICE DATED APRIL 17, 1913.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, the following public notice is issued and is applicable to any lands under the Umatilla project, Oregon, opened to irrigation by public notices heretofore issued:

1. Any water-right application heretofore filed will be abrogated as authorized by the act of February 13, 1911 (36 Stat., 902), upon the filing and recording of a new water-right application of the form adopted by the Secretary of the Interior and compliance with all the requirements of this notice. Payments to be hereafter made on account of the portion of the installment of the building charge under such new application shall be in accordance with the annual installments thereof graduated as hereinafter scheduled. The first of such payments shall be held as due March 1, 1913, and the remaining payments shall be made according to said schedule of payments until the full sum of $70 shall have been paid, less the amounts heretofore paid on account of the portion of the installment for the building charge, which shall be credited on the last payments.

2. The graduated schedule of the portions of the installments on account of the building charge is as follows, and the due dates for applications heretofore filed are as specified: March 1, 1913, $2; March 1, 1914, $3; March 1, 1915, $4; March 1, 1916, $5.50; March 1, 1917, $7; March 1, 1918, $8.50; March 1, 1919, $10; March 1, 1920, $10; March 1, 1921, $10; March 1, 1922, $10; total, $70.

3. As the terms herein authorized do not provide for payment for the furnishing of water for the irrigation season of 1913, the regulation is hereby established that water shall be furnished in the irrigation season of 1913 on a rental basis of $1.50 per acre of irrigable land, subject to the conditions regarding water service and the amount furnished as provided in the public notices, orders, and regulations heretofore in force upon the project, and no credit for the payment of such rental charge shall be allowed on any charges heretofore or hereafter due for building, operation, and maintenance.

4. To take advantage of the provisions of this notice the applicant shall, within 60 days from the date hereof, file a new water-right application as hereinbefore provided and shall accompany the same by payment of the sum of $1.50 per irrigable acre for the area shown on farm unit plats as a rental charge for irrigation water service in 1913 and accompanied also by the affidavit of the applicant supported by the affidavits of two competent witnesses and accepted by the project engineer that he has under cultivation crops requiring irrigation (not including nurse or cover crops), and has irrigated the proportions of the irrigable lands described in his water-right application as hereinafter stated; or if his land is not under crop and irrigated as aforesaid, that he has adequately prepared his land for cultivation and irrigation by clearing, checking, leveling, furrowing, or building borders, ditches, flumes, or other suitable works or structures so that water may be applied successfully in accordance with good irrigation practice over the following proportions of the irrigable area stated in his water-right application:

For the first unit of the project 60 per cent of the irrigable area.

For the second unit of the project 50 per cent of the irrigable area.

For the third unit of the project 40 per cent of the irrigable area.

For the fourth unit of the project 30 per cent of the irrigable area.

5. Such application when duly filed, accepted, and recorded shall entitle the applicant to such deferment of the charges for building, operation, and maintenance that his next installment of such charges, being the first in the foregoing schedule of installments, $2 per acre of irrigable land, shall be regarded as due on March 1, 1913, and subsequent installments on March 1 of each year thereafter. The portion of such charge on account of building shall be as scheduled in paragraph 2 hereof, and the portion for operation and maintenance due March 1, 1914, and thereafter until further notice shall be of such amount and subject to such regulations as have been heretofore announced.

6. In cases where a prior water-right applicant has not been able to show that he has cultivated and irrigated the proportion of his lands specified in paragraph 4 or has not prepared his lands for irrigation as aforesaid, and therefore is unable to secure the benefits herein provided for, such applicant may participate in such benefits by compliance with the following requirements:

7. Within 60 days from the date hereof such applicant under paragraph 6 shall commence actual field operations in clearing, leveling, checking, or otherwise preparing his land for irrigation as aforesaid, or in seeding, planting, or otherwise cultivating as aforesaid, to the satisfaction of the project engineer, and shall otherwise satisfy the project engineer that the operations thus commenced during the said 60-day period have been diligently prosecuted therein and at the expiration of that period are being prosecuted with due diligence, and in addition that the applicant has at his command such resources as in the opinion of the project engineer afford reasonable assurance that at the expiration of 8 months from the date hereof the above proportions of the lands or entry of said applicant will be fully prepared for or be actually in crop as above specified.

8. Each applicant under paragraph 6 desiring to enjoy the benefits herein offered and who intends to comply with the foregoing requirements shall within 30 days from the date hereof notify the project engineer in writing of his intention, and within the 60-day period pay the rental charge for 1913, amounting to $1.50 per acre, and inform the project engineer of the steps he is proposing to take in accordance with the above requirements and otherwise supply the project engineer with such information that the latter can certify at the expiration of the 60 days aforesaid whether such applicant has made adequate showing of results and intention to entitle him to the benefits herein offered.

9. Each applicant under paragraph 6 who has made a showing satisfactory to the project engineer at the termination of the 60-day period aforesaid, and who shall at the expiration of the eight-month period make a showing in accordance with the above schedule of cultivation, shall, upon the filing, acceptance, and recording of a water-right application as above required, be entitled to the benefits hereunder; but in case of his failure to show compliance within either the 60-day or 8-month period aforesaid the applicant shall be subject to the terms of the public notices and orders heretofore issued, the intent of this notice being to stay the enforcement of such public

notices during such periods as to permit such applicant to comply with the cultivation requirements hereof.

10. This notice shall not apply to entries or water-right applications on which two or more installments of the building charge were due and unpaid on February 29, 1912, and which said installments remain unpaid at the time of application hereunder.

11. New water-right applications, except those filed in accordance herewith, in lieu of previous water-right applications shall be subject to the terms of the public notices and orders heretofore issued.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, Umatilla project, June 30, 1913.

ASSETS.

Accounts receivable:			
Water-right building charge		$113,242.96	
Water-right operation and maintenance		19,930.07	
			$133,173.03
Inventories:			
Equipment in use—			
Animals	$2,875.00		
Mechanical and other	30,142.02		
		33,017.02	
Materials, supplies, etc., in storehouse		548.19	
Cement		1,398.24	
Lumber		635.24	
Forage		317.92	
Fuel		77.87	
Products of local operations		2,320.89	
Unadjusted transfer between projects		1,162.26	
			39,477.63
Improvements to land:			
Gross cost		1,434,377.98	
Less credits from incidental operations—			
Rentals of cottages	3,024.25		
Rentals, grazing lands	7,102.84		
Revenues, miscellaneous	10,000.00		
Loss on mess operations	[1]473.46		
Profits, mercantile stores	7.75		
Profits, hospital	208.60		
		19,869.98	
			1,414,508.00
			1,587,158.66
Deferred operation and maintenance revenues			83,621.21
Total assets			1,670,779.87

LIABILITIES.

Accounts payable:		
Labor	3,183.25	
Purchases	333.63	
Freight and express	2,098.81	
Passenger fares	386.00	
		6,001.69

[1] Deducted.

Reserves:			
For amortization of original cost of repayment—			
Building charges accrued	$289,079.76		
Building advance collections	3,346.50		
Building collections forfeited	8.04		
		$292,434.30	
For depreciation on plant and equipment		983.11	
			$293,417.41
Unadjusted credits, net earnings of Government animals			6,100.93
Net investment:			
Disbursement vouchers	1,662,816.44		
Transfers received	53,036.90		
		1,715,853.34	
Less—			
Collection vouchers	281,527.69		
Transfers issued	69,065.81		
			1,365,259.84
		350,593.50	
Total liabilities			1,670,779.87
Feature costs, Umatilla project, to June 30, 1913.			
Storage works:			
Cold Springs Dam		$373,761.08	
Buildings at dam		12,757.15	
Inlet works		13,163.58	
Main spillway		33,998.89	
Feed canal near dam		2,426.58	
Outlet works		6,766.72	
			$442,874.00
Storage feed canal:			
Diversion works and canal		242,842.36	
Repairing and priming		12,370.84	
Wasteways		7,221.59	
Bridges and crossings		2,627.52	
Concrete lining and cut-off wall		37,372.10	
Buildings		2,970.52	
			305,404.93
Distribution system:			
Canals and laterals		89,660.09	
By-pass, drops, turnouts, and miscellaneous structures		42,713.66	
Pipe lines		224,234.25	
Crossings and bridges		6,502.38	
Priming canals		3,381.84	
Subdivision of land		1,089.81	
Reconstruction and repairs, old Maxwell system		9,361.21	
Drainage		54,000.70	
Lining canals		72,699.15	
			503,643.09
Demonstration farm, barns, other buildings, and fences			3,421.47
Rights and property, real estate, and water-right adjudication			59,738.09
Buildings, Hermiston			9,292.67
Examination of project as a whole, surveys, and designs			24,956.00
West branch of project			25,729.32
West extension, examination, and investigation:			
Topographic surveys, irrigable lands		25,954.74	
Dam-site investigation		21,638.16	
Reservoir site, topographic survey		2,293.05	
Rights and property		550.67	
Location, Main Canal		4,449.55	
			54,886.17
Maxwell Dam			4,432.24
Total building cost			1,434,377.98

Operation and maintenance:		
Operation feed canal	$26,366.60	
Operation reservoir	6,373.67	
Operation laterals	24,680.52	
Maintenance feed canal	24,868.36	
Maintenance reservoir	1,675.33	
Maintenance laterals	60,849.39	
Maintenance pipe lines	3,749.39	
Maintenance drainage system	1,931.50	
Maintenance Government buildings, headquarters	1,315.42	
Maintenance Government buildings, feed canal	932.92	
Maintenance Maxwell Dam	702.76	
		$153,445.86
Total building and operation and maintenance cost		1,587,823.84

Operating revenues and expenses, Umatilla project, to June 30, 1913.

EXPENSES.

Storage:		
Operation	$6,373.67	
Maintenance	1,675.33	
		$8,049.00
Carriage:		
Operation	26,366.60	
Maintenance	25,801.28	
		52,167.88
Distribution:		
Operation	24,680.52	
Maintenance	66,616.96	
		91,297.48
Drainage, maintenance		1,931.50
		153,445.86

REVENUES.

Operation and maintenance, accruals	66,709.11
Operation and maintenance, forfeitures	1.39
Operation and maintenance, advance payment	113.75
Rental, irrigation water	3,000.40
Deferred operation and maintenance revenues	83,621.21
	153,445.86

Estimated cost of contemplated works, Umatilla project.

Feed canal:	
Enlargements provided by contract dated May 13, 1913, and approved May 23, 1913, between Joseph Cunha and the United States of America	$10,000
Additional side lining near Hermiston, 12 000 linear feet	12,000
Cold Springs Dam, miscellaneous minor construction	500
Distribution system:	
Completion of Umatilla unit	18,000
Completion of third and fourth units	3,500
Additional drainage	3,000
Further lining of distributaries	20,000
Miscellaneous	6,000
Project headquarters, remodeling office, including concrete basement and installation of heating plant	3,000
Water-right adjudication	4,000
	80,000

OREGON-CALIFORNIA, KLAMATH PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Klamath, Oreg.; Siskiyou and Modoc, Cal.

Townships: 38 to 41 S., Rs. 8 to 14 E., Willamette meridian; 46 to 48 N., Rs. 1 to 8 E., Mount Diablo meridian.

Railroad: California Northeastern.

Railroad stations and estimated population, January 1, 1913: Klamath Falls, 5,000; Midland, 100; and Ady, Oreg.

WATER SUPPLY.

Source of water supply: Upper Klamath Lake and Clear Lake.

Area of drainage basin: 3,700 square miles.

Annual run-off in acre-feet, 1904 to 1912: Link River at Klamath Falls—Maximum, 2,530,000; minimum, 1,450,000; mean, 1,790,000. Lost River and Willow Creek at Clear Lake—Maximum, 255,000; minimum, 35,000; mean, 129,000. Lost River at Olene and Merrill, 1904–1912—Maximum, 475,000; minimum, 150,000; mean, 277,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Areas for which the service is prepared to supply water, season of 1913: 29,700 acres.

Area under water-right applications and rental contracts, season of 1913: 27,745 acres.

Length of irrigation season: From May 1 to September 30—153 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area, for 9 years: 14.1 inches; 1912, 18.3 inches.

Range of temperature on irrigable area: —10° to 100° F.

Character of soil of irrigable area: Disintegrated basalt, volcanic ash, and diatomaceous earth, being largely classified as Yakima sandy loam.

Principal products: Alfalfa, hay, grain, and vegetables; stock, poultry, and dairy products.

Principal markets: Portland, Oreg.; Sacramento and San Francisco, Cal.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: November 18 and December 7, 1908; August 24, 1909; June 9, 1910.

Location of lands opened: T. 38 S., R. 9 E.; 39 S., Rs. 8 to 10 E.; 40 S., Rs. 9 to 11 E.; 41 S., Rs. 10 to 12 E., Willamette meridian, and 48 N., R. 5 E., Mount Diablo meridian.

Present status of irrigable lands opened: 44 acres entered subject to the reclamation act; 23 acres open to entry; 29,600 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water, 1.8 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land, $30.

Annual operation and maintenance charge, 75 cents per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made in October and November, 1903.
Preliminary surveys begun in 1904.
Construction recommended by a board of engineers May 1, 1905.
Construction authorized by secretary May 15, 1905.
Canal system of Klamath Falls Irrigation Co. purchased July 28, 1906.
Adams Canal purchased October 15, 1906.
Main canal completed August, 1907.
First irrigation by Reclamation Service season of 1907.
Keno Canal completed October, 1908.
South Branch Canal completed March, 1909.
Clear Lake Dam completed January, 1910.
Lost River Diversion Dam completed June, 1912.
Lost River diversion channel completed April, 1912.
Entire project 82 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Klamath project involves the utilization of Clear Lake and Upper Klamath Lake as storage reservoirs. The storage in Clear Lake, with the aid of the Lost River diversion works recently completed, combined with evaporation from Tule Lake during the next eight years, is expected to reclaim 35,000 acres of land now submerged under the northerly portion of Tule Lake. The 29,700 acres of land now being irrigated lie in Oregon in a narrow strip extending 30 miles in a southeasterly direction from Klamath Falls to the California line, receiving water from the Upper Klamath Lake through the Main, South Branch, and Adams Canal systems. Extensions from this system, to be known as the North and South Poe Valley and Nuss Lake laterals, together with the Griffith lateral, diverted from the Lost River Dam, are now under construction, and will irrigate Poe Valley and a belt of land lying east of Lost River, between Olene and Merrill, amounting to over 6,000 acres. Water is also diverted from Upper Klamath Lake on the west side of Link River, near Klamath Falls, through the Keno Power Canal, a little over a mile in length, which will ultimately furnish power for pumping or other purposes. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

CONSTRUCTION DURING FISCAL YEAR.

Second unit laterals.—The contract for the construction of the second unit laterals was awarded on September 16, 1912, work beginning on October 21, 1912. This contract involved the excavation of 290,000 cubic yards of material, and by June 30, 1913, was 85 per cent completed. These laterals comprise the North Poe Valley, South Poe Valley, Nuss Lake, and Griffith laterals, which will irrigate approximately 6,000 acres in Poe Valley and along the east side of Lost River between Olene and Merrill. One of the important structures in connection with this work is the Olene Crossing for conveying water across Lost River at Olene for the South Poe Valley and Nuss Lake laterals. This structure, which was built by Government forces in 1912, consists of a 64-foot Howe truss river span connecting two end trestles, aggregating 307 feet in length. The waterway is of metal, the inlets and outlets being built of concrete.

Drainage operations.—In August, 1912, a self-propelled traction drag-line excavator began work on the improvement of the project drainage system. The machine is well adapted to work in wet excavation, and to date has widened and deepened the Weed and Henley Drains, thereby greatly improving the adjacent lands. Comprehensive plans for the extension of this improvement work are now being outlined.

OPERATION AND MAINTENANCE.

As the season of 1912 was accompanied with excessive rainfall, the demand for irrigation water was not as pronounced as usual, the total diversion from the Upper Klamath Lake from May to September, inclusive, amounting to 42,100 acre-feet as against 45,600 for the preceding year. The average water duty for the season was 1.1 acre-foot per acre as compared with 1.2 acre-feet for 1911. Water was delivered as usual from the Keno Canal for power purposes, and for the irrigation of gardens. Storage in Clear Lake on June 30, 1913, amounted to 251,100 acre-feet. Maintenance during 1912

consisted principally of earthwork and structure repair on the smaller laterals, the lateral system throughout the project being cleaned and strengthened.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Klamath project.

Item.	1909	1910	1911	1912	1913 to June 30.
Acreage for which service was prepared to supply water	30,932	30,400	30,106	30,093	29,700
Area irrigated	21,000	[1] 27,108	23,869	23,834	15,900
Number of farms irrigated	243	354	384	405	.....
Miles of canal operated	123	132	132	132	132
Water diverted (acre-feet)	42,097	42,000	45,600	42,100	.....
Water delivered to land (acre-feet)	24,000	23,703	29,449	23,619	.....
Per acre of land irrigated (acre-feet)	1.30	.88	1.23	1.13	.....

[1] The 27,108 acres reported includes all lands for which water-right applications had been made. Much of this, however, was not irrigated.

SETTLEMENT.

During the past year practically no settlement has been made, and very little land has changed hands. The population on farms according to a census taken in November, 1912, was 1,028. In addition to this the urban population of the project probably amounts to about 5,500, making an approximate total of 6,500 individuals. The population of the project for 1911 was estimated at 7,000, and for 1910 was about 6,000. The change in population on the project for the past three years has been due principally to changes in the city of Klamath Falls, as very little difference can be noted on the farms since the Bohemian colony was established in the fall and winter of 1909–10. There have been but two homestead filings for irrigated lands under this project and neither of these has been relinquished.

PRINCIPAL CROPS.

The principal crops grown are alfalfa, barley, wheat, oats, potatoes, and timothy. The comparative acreage and value of these crops follow:

Crop statistics, Klamath project, calendar year 1912.

Crop.	Area irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	7,348	Ton	16,404	$123,030
Grain hay	1,693	do	2,617	18,319
Timothy hay	614	do	1,284	11,556
Barley	4,706	Bushel	156,538	75,138
Wheat	1,199	do	24,153	18,115
Oats	2,166	do	84,072	34,974
Rye	106	do	2,689	1,506
Potatoes	644	do	45,899	20,655
Garden	113	.....	.....	11,300
Pasture	3,142	.....	.....	[1] 52,597
Unreported	2,103	.....	.....	[1] 17,875
Total cropped	23,834	.....	.....	385,065

[1] Estimated.

FINANCIAL STATEMENTS.

Assets and liabilities, Klamath project, June 30, 1913.

ASSETS.

Accounts receivable:			
Water rentals		$166.50	
Water-right building charges		123,603.00	
Water-right operation and maintenance charges		17,154.75	
			$140,924.25
Inventories:			
Equipment in use—			
Animals	$3,101.00		
Mechanical and other	27,731.88		
		30,832.88	
Materials, supplies, etc, in storehouse		5,259.56	
Cement		904.37	
Structural iron and steel		2,259.86	
Lumber		5,432.35	
Explosives		106.13	
Forage		10.18	
Fuel		90.91	
Undistributed cost (freight and handling on inventory property)		340.44	
			45,236.68
Improvement to land:			
Gross cost		2,324,219.89	
Less credits from incidental operations—			
Rentals of grazing lands	1,850.00		
Rentals of irrigation water	26,886.51		
Revenues, miscellaneous	811.22		
Loss on mess operations	[1]981.27		
Profits, mercantile stores	808.18		
Profits, hospital	160.65		
Adjustments, contractor's freight refunds	8,314.31		
		37,849.60	
			2,286,370.29
Deferred operation and maintenance revenues			24,451.07
Total assets			2,496,982.29

LIABILITIES.

Accounts payable:			
Labor		3,427.19	
Purchases		2,060.83	
Contract estimates		13,209.19	
Contract holdbacks		5,972.23	
Freight and express		1,453.31	
Passenger fares		93.90	
Land agreements		6,255.00	
Miscellaneous		5.00	
			32,476.65
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	379,350.00		
Building advance collection	1,164.00		
		380,514.00	
For depreciation on plant and equipment		554.75	
			381,068.75
Unadjusted credits, net earnings of Government animals			293.49

[1]Deduct.

Net investment:			
Disbursement vouchers	$2,431,000.84		
Transfers received	63,285.32		
		$2,494,286.16	
Less—			
Collection vouchers	379,960.95		
Transfers issued	31,181.81		
		411,142.76	
			$2,083,143.40
Total liabilities			2,496,982.29

Feature costs, Klamath project, to June 30, 1913.

Canal system:		
Main Canal	$518,931.51	
Main Canal laterals	48,727.71	
East Branch Canal	48,345.68	
Griffith lateral	17,048.02	
Nuss lateral	10,206.43	
Olene crossing	7,442.53	
Keno Canal	98,984.39	
South Branch Canal	188,449.15	
South Branch laterals	57,065.19	
Poe Valley Canal	61,005.19	
Poe Valley laterals	11,077.30	
West Side Canal (upper project)	4,257.11	
East Side Canal (upper project)	5,577.12	
Enlargement Adams Canal	937.73	
Carr extension of Adams Canal and flume	14,050.62	
		$1,092,105.68
Storage works:		
Clear Lake Dam	114,605.38	
Clear Lake dikes	12,803.23	
Clear Lake Reservoir, maintenance	9,391.90	
Horse Fly Reservoir	670.49	
		137,471.00
Diversion works, headquarters Griffith lateral		1,251.98
Buildings:		
Headquarters (office, barns, storehouse)	11,092.28	
Gatekeepers' and employees' cottages	5,389.44	
		16,481.72
Drainage:		
Langells Valley drain (upper project)	428.16	
Lower project	32,885.62	
Lower lake and pumping plant	11,716.70	
		45,030.48
Telephone system		25,604.47
Real estate (rights and property), canals, rights of way, and land purchased		625,637.96
Examination of project as a whole:		
Preliminary expense	47,356.44	
Hydrographic work	21,915.67	
Modoc unit (reconnoissance and soil map)	5,624.34	
		74,896.45
Experimental farm (including buildings, etc.)		15,765.18
Administrative of project as a whole, balance undistributed		689.68
Plant account:		
Rock-crushing plant	3,063.27	
Keno Canal, operation and maintenance	3,202.79	
Keno Canal power plant	788.51	
South Branch power plant	740.10	
		7,794.67

Tule Lake reclamation:		
Lost River Dam	$144,649.67	
Lower River diversion channel	119,362.19	
Maintenance	6,117.25	
Tule Lake outlet	11,361.51	
		$281,490.62
Total building cost		2,324,219.89
Operation and maintenance:		
General expense (undistributed)	36,407.39	
Property, maintenance	1,823.57	
Earthwork, repairs	29,819.55	
Structures, repairs	18,311.71	
Drainage	8,169.58	
Water distribution	15,858.15	
Telephone, repairs	2,776.67	
Corral expense	11,079.77	
Cement pipe, manufacture of	180.61	
Gates and fences	811.84	
Worden farm	1,965.23	
Total operation and maintenance cost		127,204.07
Total building and operation and maintenance cost		2,451,423.96

Operating revenues and expenses, Klamath project, to June 30, 1913.

EXPENSES.

Undistributed expenses	$127,204.07

REVENUES.

Operation and maintenance, accruals	100,982.25
Operation and maintenance, advance payment	24.75
Rental of irrigation water	1,746.00
Deferred operation and maintenance revenues	24,451.07
	127,204.07

Estimated cost of contemplated works, Klamath project.

Lands, rights, and property		$2,000.00
Adams canal, enlargement of		50,000.00
Modoc unit, preliminary		20,000.00
Installing gates in Klamath Straits and supplying the Van Brimmer ditch		60,000.00
Power house, Keno canal		50,000.00
General expenses		7,000.00
Second unit laterals (uncompleted portion):		
Poe Valley canals	14,809.00	
Nuss lateral	2,800.00	
Griffith lateral	3,197.00	
Olene crossing	1,721.00	
Distribution system, second unit	5,842.00	
		28,369.00
Total		217,369.00

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Butte and Meade.

Townships: 6 to 10 N., Rs. 3 to 8 E., Black Hills meridian.

Railroads: Chicago & North Western; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul.

Railroad stations and estimated population January 1, 1913: Belle Fourche, 1,500; Newell, 450; Nisland, 300; Fruitdale, 150; Sturgis, 1,780; and Whitewood, 400.

WATER SUPPLY.

Source of water supply: Belle Fourche River.
Area of drainage basin: 4,265 square miles.
Annual run-off in acre-feet of Belle Fourche River at diversion dam (4,265 square miles) 1903 to 1912: Maximum, 477,150; minimum, 129,000; mean, 303,315.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 65,852 acres.
Area under water-right applications, season of 1913: 46,866 acres.
Length of irrigating season: May 1 to October 1, 152 days.
Average elevation of irrigable area: 2,800 feet above sea level.
Average annual rainfall on irrigable area: Average for past 7 years, 13.6 inches; 1912, 17.02 inches.
Range of temperature on irrigable area: —28° to 103° F.
Character of soil of irrigable area: North side of Belle Fourche River principally heavy clay with scattered areas of sandy clay loam; south side, sandy loam. All of the soils are heavy enough not to be disturbed by winds.
Principal products: Grain, alfalfa, sugar beets, potatoes, garden truck, and small fruit.
Principal markets: Omaha, Nebr.; Chicago, Ill.; and mining towns in the Black Hills.

LANDS OPENED FOR IRRIGATION.

Date of public notices, regulations, and orders relating thereto: June 21, 1907; May 29, 1908; January 18, 1909; February 19 and November 26, 1910; January 24, March 9, May 4, and December 30, 1911; February 3 and May 2, 1912; February 26 and June 23, 1913.
Location of lands opened: T. 7 N., Rs. 5 to 7 E.; T. 8 N., Rs. 3 to 7 E.; T. 9 N., Rs. 2 to 6 E.; T. 10 N., Rs. 3 to 5 E.; Black Hills meridian.
Present status of lands opened: 21,165 acres entered subject to the reclamation act; 3,921 acres open to entry; 3,771 acres of State lands; 36,995 acres in private ownership.
Limit of area of farm units: Public, 80 acres; private, 160 acres.
Duty of water: 2 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $30, $35, and $40.
Annual operation and maintenance charge: 60 cents per acre of irrigable land until further notice.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers April 29, 1904.
Construction authorized by Secretary May 10, 1904.
Diversion dam and inlet canal completed September, 1907.
South canal and lateral system completed April, 1910.
Belle Fourche Dam completed June, 1911.
First section of north canal completed January, 1908.
Second section of north canal and lateral system completed June, 1912.
First irrigation, season of 1908.
Entire project 88 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Belle Fourche project provides for the diversion of water from the Belle Fourche River by means of a dam about 2 miles below Belle Fourche, S. Dak., and an inlet or supply canal about 7 miles in length

into a storage reservoir controlled by the Belle Fourche Dam on Owl Creek, a tributary of the Belle Fourche River; the distribution of water from the inlet canal to a small area of land; and the distribution of water from the reservoir through two canal systems to lands on both sides of the Belle Fourche River. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan completed are: The diversion dam and headworks, inlet canal, Belle Fourche storage dam, South Canal, first and second divisions of the North Canal; laterals under the South Canal; and laterals under the first and second divisions of the North Canal. The features remaining for future construction are: The last 18 miles of the North Canal and approximately 150 miles of laterals, including Willow Creek and Nine Mile laterals and their branches.

CONSTRUCTION DURING FISCAL YEAR.

During the season of 1912 the first, second, and third units of the project were irrigated. The third unit, comprising 19,500 acres of irrigable land, was opened by public notice of May 2, 1912. During 1912 there were 45,169 acres covered by water-right applications and 27,897 acres were in crop and irrigated. Water was stored in the reservoir during the winter of 1911 and the spring of 1912. The season was favorable, and good crops were harvested.

OPERATION AND MAINTENANCE.

During the season the first, second, and third units of the project were irrigated. The third unit, comprising 19,500 acres of irrigable land, was opened by public notice of May 2, 1912. During 1912 there were 45,169 acres covered by water-right applications and 27,897 acres were in crop and irrigated. Water was stored in the reservoir during the winter of 1911 and the spring of 1912. The season was favorable, and good crops were harvested.

During 1913 the same system is being operated as in 1912. At the close of the fiscal year 46,866 acres were covered with water-right applications and 32,374 acres were being irrigated. Storage of water began in the reservoir on March 8, and on June 30 there were 119,180 acre-feet in storage. The season has been favorable, copious rains making early irrigation unnecessary, and on June 30 the crops were in good condition.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Belle Fourche project.

Item.	1909	1910	1911	1912	1913 (to June 30).
Acreage for which service was prepared to supply water	11,923	47,568	47,568	65,852	65,852
Acreage irrigated	5,613	15,410	19,786	27,897	32,374
Number of farms irrigated	74	312	350	537	623
Miles of canal operated	63	291	295	467	474
Water stored (acre-feet)	None.	32,000	23,900	96,000	129,000
Water diverted (acre-feet)	13,486	65,900	79,155	166,835	.....
Water delivered to land (acre-feet)	9,317	30,000	32,400	30,390	.....
Per acre of land irrigated (acre-feet)	1.66	1.95	1.64	1.10	.....

Settlement, Belle Fourche project.

Item.	1910	1911	1912
Estimated population on farms	1,300	1,450	1,800
Number of farms	338	363	611
Number of relinquishments	1	3	2
Cancellations for nonpayment	.....	1	2

PRINCIPAL CROPS.

Wheat, oats, alfalfa, and corn were, in the order named, the most important crops grown on the project during the year 1912. These four crops represented about 91 per cent of the cropped area for the season and returned 83 per cent of the total estimated crop value. The maximum yields were: Wheat, 43 bushels per acre; oats, 112 bushels per acre; alfalfa, 6 tons per acre; and corn, 50 bushels per acre. Potatoes made an exceptional showing and gave a maximum yield of 400 bushels per acre, with an average yield of 100 bushels per acre for the entire project. The average yields of the other crops were as follows: Wheat, 18 bushels; oats, 34 bushels; alfalfa, 2.6 tons per acre.

Crop statistics, Belle Fourche project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	3,906	Ton.....	8,055	$40,275
Barley	247	Bushel..	6,107	3,053
Corn	1,830	...do....	21,680	10,840
Flax	261	...do....	1,383	1,798
Native hay	3,009	Ton.....	1,788	21,456
Oats	5,478	Bushel..	184,371	64,530
Potatoes	357	...do....	35,984	14,394
Wheat	11,083	...do....	194,756	136,329
Miscellaneous	1,632	.....	.....	15,927
Total cropped	27,803	.....	.....	308,602
Other purposes	94	.....	.....	.....
Total irrigated	27,897	.....	.....	.....

FINANCIAL STATEMENTS.

Assets and liabilities, Belle Fourche project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to special financial agents			$78.08
Accounts receivable:			
Uncollected water rights, building charges		$91,328.40	
Uncollected water rights, operation and maintenance charges		34,609.05	
Uncollected, miscellaneous		78.49	
			126,015.94
Inventories:			
Mercantile store		22.73	
Equipment in use—			
Government animals	$6,477.50		
Mechanical and other	26,653.61		
		33,131.11	

Materials and supplies in storehouse		$4,529.86	
Cement		3,114.70	
Structural iron and steel		1,211.97	
Lumber		8,858.18	
Forage		2,204.34	
Fuel		106.11	
Products of local operations		967.67	
			$54,146.67
Improvements to land:			
Gross cost		3,140,869.36	
Less credits from incidental operations—			
Rentals of cottages	$2,496.18		
Rentals of grazing and farming lands	1,390.20		
Rentals of tolls, telephone lines	85.85		
Revenues, miscellaneous	30.00		
Loss on mess house operations	[1] 4,813.74		
Profits on mercantile store	1,421.57		
Contractors' freight refunds	2,535.93		
Forfeitures, defaulting bidders and contractors	7,337.50		
		10,483.49	
			3,130,385.87
Deferred operation and maintenance revenues			83,028.26
Total assets			3,393,654.82

LIABILITIES.

Accounts payable:			
Labor		5,575.57	
Purchases		5,530.18	
Contract estimates		34,532.26	
Contract holdbacks		45,357.67	
Freight and express		3,226.65	
Passenger fares		76.54	
Miscellaneous		768.22	
			95,067.09
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	182,808.33		
Advance building payments	2,887.00		
Forfeitures, building payments	576.00		
		186,271.33	
For depreciation on plant and equipment		812.88	
			187,084.21
Unadjusted credits, net earnings of Government animals			6,656.56
Net investment:			
Disbursement vouchers	3,244,314.90		
Transfers received	79,947.48		
		3,324,262.38	
Less—			
Collection vouchers	183,215.83		
Transfers issued	36,199.59		
		219,415.42	
			3,104,846.96
Total liabilities			3,393,654.82

[1] Deduct.

Feature costs, Belle Fourche project, to June 30, 1913.

Diversion dam and structures			$117,322.76
Supply canal and structures (completed; for details see tenth annual report)			331,182.00
Storage works:			
Dam and appurtenances—Belle Fourche—			
Orman & Cook contract		$276,916.36	
National Surety Co. contract		877,242.75	
Clearing Belle Fourche Reservoir		1,837.84	
Installation of balanced valves		52,031.86	
Graveling toe of dam		23,618.33	
Fastening revetment blocks		2,889.92	
			1,234,537.06
Distribution system:			
North Canal—			
Division A (completed; see tenth annual report)		110,371.90	
Division B—			
Excavation	$113,320.38		
Structures	77,719.82		
		191,040.20	
Division C—			
Survey and design	244.24		
Excavation	69,450.85		
Structures	34,224.04		
		103,919.13	
Division D—			
Survey and design		732.22	
			406,063.45
South Canal (completed; see tenth annual report)			487,258.04
Lateral system—			
Division A (completed; see tenth annual report)		246,605.74	
Division B		106,301.27	
Division C		64,325.91	
Division D—survey and design		4,609.25	
			421,842.17
Ninemile Creek extension:			
Excavation		24,429.92	
Structures		11,835.26	
			36,265.18
Telephone system, construction			12,674.66
Real estate (rights and property):			
Lands purchased (not submerged)		34,117.42	
Lands purchased (submerged by reservoir)		19,724.77	
			53,842.19
Irrigable lands, farm unit subdivision			4,792.73
Buildings			27,054.07
Demonstration farm			4,023.45
Reconnoissance examination			806.09
Extraordinary expense (flood)			1,811.19
Inventory cost, ledger supplies			1,394.32
Total building cost			3,140,869.36
Operation and maintenance:			
Orman unit—			
Inlet canal	15,277.50		
South canal	10,602.09		
North canal	8,987.43		
Laterals	42,319.02		
		77,186.04	
Dam—Belle Fourche		11,673.24	
Drainage—			
Seepage ditches	3,619.60		
Toe of Belle Fourche Dam	14,494.82		
		18,114.42	

Operation and maintenance—Continued.			
Vale unit—			
South Canal	$20,500.17		
Laterals A	11,630.78		
Laterals C	18,202.94		
		$50,333.89	
Newell unit—			
North Canal, Division B	1,638.08		
North Canal, Division C	1,497.66		
Laterals	21,697.53		
Indian Creek flume	1,082.44		
Horse Creek flume	569.21		
		26,484.92	
Total operation and maintenance cost			$183,792.51
Total building, operation, and maintenance cost			3,324,661.87

Operating revenues and expenses, Belle Fourche project, to June 30, 1913.

EXPENSES.

Undistributed expenses, operation and maintenance cost ledger	$183,792.51

REVENUES.

Operation and maintenance, accruals	99,998.01
Operation and maintenance, forfeitures	178.60
Operation and maintenance, advance payments	11.20
Rental, operation and maintenance, irrigating water	560.39
Miscellaneous revenues	16.05
Deferred operation and maintenance revenues	83,028.26
	183,792.51

Estimated cost of contemplated work, Belle Fourche project.

Operation and maintenance of project for irrigation of about 69,000 acres of land	$55,200.00
North Canal, division "C"	29,304.62
Dry Creek flume on North Canal	13,000.00
North Canal, division "D"	22,000.00
Laterals, division "B"	14,850.00
Laterals, division "D," Dry Creek to Willow Creek	30,000.00
General expense (on construction)	10,000.00
Contingencies (on construction)	8,000.00
Total	182,354.62

UTAH, STRAWBERRY VALLEY PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Utah and Wasatch.

Townships: 8 and 9 S., Rs. 1 to 3 E., Salt Lake base and meridian.

Railroads: Denver & Rio Grande; San Pedro, Los Angeles & Salt Lake.

Railroad stations and estimated population, January 1, 1913: Spanish Fork, 3,600; Payson, 2,600; Springville, 3,400.

WATER SUPPLY.

Source of water supply: Strawberry and Spanish Fork rivers and a number of small streams and springs not on the watersheds of these two. Contemplated pumping plants.

Area of drainage basins: Strawberry River, including Indian and Trail Hollow creeks, 175 square miles; Spanish Fork River, 670 square miles.

Annual run-off in acre-feet: Strawberry River in Strawberry Valley, including Indian and Trail Hollow creeks, 1903–1906 and 1909–1912—Maximum, 150,000; minimum, 49,000; mean, 75,000. Spanish Fork River at Spanish Fork, 1903–1912—Maximum, 227,000; minimum, 65,000; mean, 114,200.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water during the season of 1913, none; 32,000 acre-feet available in reservoir.

Length of irrigating season, April 15 to September 30 (169 days).

Average elevation of irrigable area, 4,600 feet above sea level.

Average annual rainfall, 18 inches; at Payson (six years), 20.14 inches (1911, 18.79 inches); at Provo (17 years), 13.71 inches (1912, 17.80 inches).

Range of temperature on irrigable area: —10° to 95° F.; mean temperature at Provo, 49.3° F.

Character of soil of irrigable area: Sandy loam, heavy clay, and varying mixture of both; black alluvium. Bench land: Loam and gravel. Much of the soil is underlaid by a coarse gravel, and the natural drainage is excellent.

Principal products: Alfalfa, hay, cereals, sugar beets, fruits, and vegetables.

Principal markets: Salt Lake City, Utah, and adjacent towns and mining districts.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers October 2, 1905.

Construction authorized by secretary December 15, 1905.

Excavation of tunnel commenced October, 1906.

Power canal commenced May, 1907; completed December, 1908.

Concrete lining in tunnel commenced October, 1910.

Construction of Strawberry Dam commenced July, 1911.

Construction of Indian Creek Dike commenced July, 1911.

Indian Creek and Trail Hollow Diversion canals commenced September, 1911.

Excavation of tunnel completed June 20, 1912.

Storing of water in Strawberry Reservoir begun on July 14, 1912.

Construction of Indian Creek Dike completed September, 1912.

Indian Creek and Trail Hollow Creek diverted into Strawberry Reservoir November 20, 1912.

Indian Creek and Trail Hollow Diversion canals 95 per cent completed November, 1912.

Concrete lining in tunnel completed November, 1912.

Installation of gates at east portal completed December, 1912.

Construction of Strawberry Dam 95 per cent completed June 30, 1913.

Entire project 69 per cent completed June 30, 1913.

IRRIGATION PLAN.

The irrigation plan of the Strawberry Valley project provides for the storage of water in a reservoir on Strawberry River; the discharge of the stored water through Strawberry Tunnel, approximately 3¾ miles long, into Diamond Fork, a tributary of Spanish Fork River, and the diversion of water from Spanish Fork River into canal systems, watering lands east and south of Utah Lake. A hydroelectric plant on the south side of the river 3¼ miles below the diversion dam supplies power for construction and commercial purposes. Part of the power developed will ultimately be used for pumping water for irrigation of high lands and drainage of low lands. The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project, and proposes to use such water in connection therewith.

The completed features of the irrigation plan are: Diversion dam on Spanish Fork River; power canal; the first unit of the hydroelectric power plant on Spanish Fork River; Strawberry Tunnel, through the rim of the Great Basin,

and the features in connection with the Strawberry Reservoir, which consists of the following: Strawberry River Storage Dam (about 95 per cent completed); Indian Creek Dike, built in a depression between the Strawberry and Indian Creek drainage; Indian Creek and Trail Hollow Diversion canals and appurtenant structures for the diversion of Indian and Trail Hollow creeks into the reservoir. In connection with the construction of these features, 43 miles of wagon road, 35 miles of telephone lines, and 46¾ miles of high-tension power-transmission lines have been built. Power from the United States Reclamation Service power house is being supplied to Payson, Salem, and Spanish Fork for lighting and other purposes, the Reclamation Service having built the high-tension lines from its power house to these towns. The towns built their own substations and distribution lines.

Features remaining for future construction are the Highline Canal; the construction and extension of the existing distribution system; installation of pumping plants, drainage system, and second unit of hydroelectric power plant.

CONSTRUCTION DURING FISCAL YEAR.

Strawberry Dam.—This feature was 95 per cent completed at the end of the fiscal year. The placing of earth fill in the body of the dam, the paving of the upstream slope, all the concrete work in connection with the sluicing tunnel and core-wall, and the placing of sluicing gates in the sluicing tunnel were completed early in the year. The storing of water in this reservoir was begun July 14, 1912, when the water in Strawberry River was shut off at Strawberry Dam. The work remaining to be done on this feature consists of some riprapping on the downstream slope, the completion of the excavation of the wasteway and the construction of a reenforced-concrete bridge over the wasteway. The scarcity of labor and unfavorable weather conditions during the latter part of the summer of 1912 delayed progress. On June 30, 1913, the elevation of the water in Strawberry Reservoir was 7,524 feet, there being 32,000 acre-feet of water available for use.

Indian Creek Dike.—All work on this feature was completed during the latter part of September, 1912. This structure is 37 feet high, 1,311 feet long, and contains the following quantities of material: Earth fill, 101,167 cubic yards; paving upstream slope, 11,041 cubic yards; concrete, 1,516 cubic yards.

Indian Creek and Trail Hollow Diversion Canal.—This feature is 95 per cent completed. The contractor was delayed so much on account of labor conditions, bad weather, etc., that considerable assistance was necessary from the Government forces at Strawberry Dam in order to complete the excavation work sufficiently to turn the water through on November 20, 1912. This feature is made up as follows: Six miles of canal, 4 miles between Trail Hollow and Indian Creek having a capacity of 125 second-feet and 2 miles between Indian Creek and the reservoir having a capacity of 600 second-feet. There are 3 reinforced concrete bridges with spans of 27¼ feet on the Trail Hollow Canal and a reinforced concrete diversion dam and intake structures on Indian Creek; two wagon bridges with wooden superstructures on the section between Indian Creek and the reservoir, and a reinforced concrete notched weir and terminal drop chute at the lower end of the canal where the water is dropped into the reservoir.

Strawberry Tunnel.—This feature was completed in November, 1912. During the year the tunnel lining was completed. At East Portal the tunnel was extended 700 feet by means of a concrete cir-

cular cut-and-cover section to a concrete intake situated at the lower end of the 1,300 foot entrance channel with side slopes of 5 to 1. The shaft for operation of gates was lined with concrete and all gates and hoisting mechanism installed. Work at East Portal was not quite finished during the year, the cold weather and snows setting in before the operating house and gate tenders' buildings could be completed. These are now being built and should be finished by December, 1913. The water developed during the construction of the tunnel (about 7 second-feet) continues to flow. At West Portal a reinforced concrete buttressed weir was completed as well as a suitable portal structure to Strawberry Tunnel. A Highline Road was built between East Portal and Strawberry Dam via Indian Creek Dike, as the old valley road is now submerged. All concrete structures exposed to weathering are being waterproofed. Work is in progress at Strawberry Dam and East Portal finishing up all work contemplated. The various camps are being dismantled and machinery and equipment hauled to Diamond Switch. It is expected that the entire storage unit will be completed by December, 1913.

SURVEYS AND INVESTIGATIONS.

Topographic surveys were made of the east side of Goshen Valley in addition to the irrigable area already surveyed. A complete scheme has been developed for the proposed distribution system and estimates made of all quantities therein for both lined and unlined lateral systems. Plans and specifications were drawn up for letting contracts on the Highline Canal and necessary structures. The irrigation investigations begun in 1910 and 1911 were continued in 1912, but will be discontinued in 1913. These have for their object the determination of the probable water consumption and the character and extent of crops that will be raised, based on existing conditions, and the economic utilization of all possible water resources.

SEEPAGE AND DRAINAGE.

There are at the present time large areas on the project in the immediate vicinity of Utah Lake that are unfit for cultivation, due to high elevation of the water plane, and in some places on the higher grounds waters in the form of springs are being discharged at the foot of slopes sufficient to produce boggy and swamped conditions. The cause of this excess water in the soil is probably due in part to losses from the present existing irrigation canals and waste from irrigation (during the first part of the irrigation season when the Spanish Fork River is in flood an acre-foot per acre is very often applied to the land at a single irrigation), and in part to run-off from adjacent mountains which sinks into the gravel at the foot of steep slopes. In order to reclaim the lands already too wet for cultivation and prevent the rise of the water table on additional areas, when the water supply is increased and more lands brought under irrigation, the early construction of drainage works is considered necessary. Investigations for the purpose of determining the general character and extent of the drainage works required on about 40,000 acres and a preliminary estimate of the cost were undertaken during the year.

WATER USERS' ASSOCIATION.

The Strawberry Valley Water Users' Association, a corporation organized under the laws of the State of Utah, and made up of owners of land under the Strawberry Valley project, entered into a contract with the Secretary of the Interior on March 5, 1906, under the terms of which it agreed to take certain irrigation water developed by the United States Reclamation Service at the mouth of Spanish Fork Canyon and do everything necessary, including the taking over the control of all existing canals on the project, to deliver this water to the land owned by those subscribing for stock in the association and applying to the Reclamation Service for water. Nothing else has been done by them beyond having a stock subscription and contract signed by the owners of approximately 50,000 acres of land and issuing a descriptive pamphlet for advertising purposes, describing the land under the project. An assessment was levied by the association, but only a small part was paid.

On October 10, 1912, the Director of the Reclamation Service met with the board of directors of the Strawberry Valley Water Users' Association at Spanish Fork, Utah; the interpretation that the department put upon the contract between the water users' association and the Secretary of the Interior was explained, and attention called to certain requirements in this contract that the association would be expected to comply with. At several subsequent meetings of the board of directors of the Strawberry Valley Water Users' Association, held for the purpose of taking the necessary action to carry out the terms of the contract, a difference of opinion arose as to whether the cost of the Highline Canal from the Reclamation Service power-house site on Spanish Fork River to Goshen Pass should be charged to the project as a whole or charged to that part of the project which would be directly benefited by it. A number of meetings of the board of directors were held and the matter discussed at some length, but they were unable to arrive at a satisfactory agreement under which to proceed, with the result that the water users under the project have formed themselves into two divisions—one made up of those owning a large area of dry and some partly irrigated land in the vicinity of Payson and Mapleton, and those living in the vicinity of Spanish Fork and owning a large area of land and a partial water right under the five canals diverting water from Spanish Fork River. During the latter part of January separate petitions were sent to the Secretary of the Interior from Spanish Fork and from Payson, setting forth the desires of the water users in these two districts. In substance, these two petitions requested that the Secretary adopt two almost opposite policies. On March 11 the Secretary of the Interior formally called upon the association to take steps to carry out the terms of the contract of March 5, 1906. The association was given 60 days in which to advise the department that steps were being taken to comply with the terms of the contract, the department stating that failure to comply would be regarded as a breach of the contract. On June 30 nothing had been received from the water users' association regarding the communication of March 11 beyond acknowledging its receipt. It is expected that representatives of the Reclamation Service will visit the project within a short time and meet with the direc-

tors of the Strawberry Valley Water Users' Association with the idea of deciding on a policy that will be satisfactory to all concerned.

FINANCIAL STATEMENTS.

Assets and liabilities, Strawberry Valley project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to S. F. A			$205.20
Accounts receivable, miscellaneous power and light			854.98
Inventories:			
Mercantile stores		$926.45	
Equipment in use—			
Rentals of cottages	4,642.80		
Mechanical and other	30,666.41		
		33,311.41	
Materials, supplies, etc., in storehouse		40,979.63	
Lumber		4,280.49	
Unadjusted transfer between projects		[1] 436.43	
Undistributed cost (freight and handling on inventory property)		82.00	
			79,143.55
Improvements to land:			
Gross cost		2,287,212.68	
Less credits from incidental operations—			
Rentals of cottages	4,642.80		
Rentals of grazing lands	44,704.12		
Rentals of power and light	13,548.19		
Rentals of telephones	1,043.10		
Profits on mess operations	11,190.81		
Profits on mercantile stores	9,723.31		
Loss on hospital	[1] 2,956.15		
		81,896.18	
			2,205,316.50
Total assets			2,285,520.23

LIABILITIES.

Accounts payable:			
Labor		7,482.06	
Purchases		1,978.48	
Contract holdback		2,949.68	
Freight and express		65.67	
Passenger fares		134.15	
Coupons		162.30	
Miscellaneous—horse hire		585.00	
			13,357.34
Reserves for depreciation on plant and equipment			590.50
Unadjusted credits, net earnings of Government animals			441.26
Net investment:			
Disbursement vouchers	2,320,838.42		
Transfers received	79,469.27		
		2,400,307.69	
Less—			
Collection vouchers	112,679.64		
Transfers issued	16,496.92		
		129,176.56	
			2,271,131.13
Total liabilities			2,285,520.23

[1] Deduct.

Feature costs, Strawberry Valley project, to June 30, 1913.

Storage works:		
Strawberry Dam construction	$231,292.09	
Strawberry Dam construction plant	12,305.99	
Reservoir maintenance	5,820.64	
Indian Creek dike	117,966.85	
Indian Creek and Trail Hollow diversion canal	64,593.52	
Intake, spillways, and bridges	21,945.47	
Terminal chute, drop, and bridge abutments	19,651.62	
		$473,576.19
Strawberry Tunnel:		
East portal construction plant	3,471.25	
East portal controlling works and intake	90,763.04	
Driving Strawberry Tunnel	739,480.46	
Lining Strawberry Tunnel	280,436.77	
Clearing site for outlet structures	2,555.70	
Portal arch	3,316.89	
Outlet weir	5,817.84	
West portal construction plant	14,513.70	
Stilling basin	1,283.74	
		1,141,639.39
Power canal:		
Spanish Fork Reservoir	4,492.68	
Diversion dam	39,695.90	
Excavation, classes 1, 2, 3, 4	136,028.18	
Concrete lining, resloping and cleaning	48,668.62	
Driving tunnels 1 and 2	33,192.88	
Lining tunnels 1 and 2	16,265.57	
Structures	40,629.74	
Bridges and walks	5,297.15	
River improvements	5,882.81	
Raising concrete lining	1,601.11	
Canal repairs	6,574.08	
Concrete arch covering	3,096.07	
Gates in fore bay	824.65	
Diversion dam camp	6,812.71	
		349,062.15
Buildings, construction of:		
Strawberry Dam camp	13,730.88	
East portal camp	8,357.37	
West portal camp	36,849.98	
Diamond switch camp	5,872.94	
		64,811.17
Examination of project as a whole:		
Surveys, topographic	9,514.29	
Surveys, reconnoissance	5,261.52	
Stream gauging	9,511.25	
Irrigation investigations	11,911.75	
		36,198.81
Administrative buildings		5,250.00
Telephone lines		14,578.61
Wagon roads		43,854.61
Hydroelectric power plants:		
Excavation, construction, machinery and installing	55,770.35	
Operation and maintenance balance	17,695.86	
		73,466.21
Power transmission line		1 [illegible]95.86
Highline Canal		[illegible]457.63
Distribution system, preliminary investigation		4,984.97
Real estate, rights, property, lands purchased		46,275.49
Inventory of cost ledger supplies		591.59
Total building cost		2,287,212.68

Estimated cost of contemplated work, Strawberry Valley project.

Grazing land maintenance	$2,000
Strawberry Dam	20,000
Indian Creek dike	5,000
Indian Creek and Trail Hollow diversion canal	4,000
Strawberry Tunnel	30,000
Telephone lines	3,000
Wagon roads	3,000
Power canal	15,000
Hydroelectric power plant	15,000
Power transmission lines	8,000
Highline Canal	410,000
Distribution system	5,000
Real estate	40,000
Investigation of project as a whole	5,000
Administrative buildings	3,000
Siphon and small canal, east bench	50,000
Total	618,000

WASHINGTON, OKANOGAN PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

County: Okanogan.

Townships: 33 to 34 N., Rs. 25 to 27 E., Willamette meridian.

Railroad: Great Northern (branch line).

Railroad stations and estimated population, January 1, 1913: Okanogan, 700; Omak, 450; Riverside, 400.

WATER SUPPLY.

Source of water supply: Salmon Creek.

Area of drainage basin: 121 square miles above Conconully Dam.

Annual run-off in acre-feet of Salmon Creek at Jones's ranch, near Okanogan (140 square miles), 1903 to 1912: Maximum, 56,500; minimum, 17,350; mean, 30,750.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1913: 10,071 acres.

Area under water-right applications, rental, and vested water-right contracts, etc., to June 30, season of 1913: 9,861 acres.

Length of irrigating season: May 1 to September 1, 123 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Average annual rainfall on irrigable area: At Omak, Wash., for last three years, 8.15 inches; total for 1912, 17.90 inches. At Conconully, Wash., at base of Salmon River watershed, average for 12 years, 16.37 inches.

Range of temperature on irrigable area: —10° to 105° F.

Character of soil of irrigable area: Volcanic ash and gravel on upper benches and sand and gravel on lowlands along Okanogan River.

Principal products: Fruit, hay, grain, and vegetables.

Principal markets: Local.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 12, 1908; March 12, 1910; April 8, 1910; February 23, 1911; March 28, 1911; April 29, 1912; July 6, 1912; March 10, 1913; June 16, 1913.

Location of lands opened: Ts. 33 and 34 N., Rs. 26 and 27 E., Willamette meridian.

Present status of irrigable area opened: Entered subject to the reclamation act, 1,234 acres; open to entry, none; private lands, 8,393 acres.

Limit of area of farm units: Public, 40 acres; private, 40 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $65. Owing to proposed reconstruction of portions of project, new contract has been executed with Okanogan Water Users' Association providing for a maximum building charge of not more than $110 per acre.

Annual rental charge: $3 per acre of irrigable land for all lands where stay of proceedings was taken advantage of: otherwise, operation and maintenance charge of $2.25 per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers, October 9, 1905.
Construction authorized by Secretary, December 2, 1905.
Grading of canals and distribution system completed, May, 1908.
Salmon Lake inlet and outlet completed, July, 1908.
First irrigation by Reclamation Service, season of 1908.
Conconully Dam completed, August, 1910.
Entire project completed, October, 1910.

IRRIGATION PLAN.

The irrigation plan of the Okanogan project provides for the storage of water in Salmon Lake and in Conconully Reservoir, controlled by Conconully Dam on Salmon Creek, about 2 miles below Conconully, Wash.; the control of Salmon Lake Reservoir by a short inlet canal from Salmon Creek and concrete outlet works; the control of Conconully Reservoir by means of an outlet tunnel discharging into Salmon Creek below the storage dam; and the diversion of water from Salmon Creek by a dam about 12 miles below the reservoir into a canal system watering lands in the valley of Okanogan River between Riverside and Okanogan, Wash. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating waters arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

All of the features of the project—consisting of the inlet canal and outlet works to Salmon Lake; Conconully hydraulic filled dam, spillway, and outlet works; the diversion weir and distribution system—are completed and have been in use during the irrigation seasons of 1910, 1911, 1912, and 1913.

CONSTRUCTION DURING FISCAL YEAR.

Canal lining.—During the fall of 1912 and spring of 1913 the work of placing the concrete lining in those portions of the canals and laterals of the distribution system where seepage conditions were found to be bad was continued, 32,219 linear feet of canals being lined with a plaster lining 1½ inches in thickness, placed upon a specially prepared foundation following the natural slope of the canals. This work required 1,641 cubic yards of concrete.

Telephone line.—During the summer and fall of 1912 the telephone system on the project was rebuilt, consisting of the line between Conconully Dam and project headquarters, and the lines along the canals of the project, amounting to 25 miles. The work involved straightening the line, setting new poles where necessary, and adding another wire, making the system a metallic circuit instead of the old ground circuit.

Salmon Lake improvements.—During the fall of 1912 the outlet channel from Salmon Lake was lowered 3 feet for a distance of 850 feet, and a 24 by 48 inch wooden flume built in the new channel.

Extension of distribution system.—During the summer of 1912 surveys and estimates were made preparatory to extending the distribution system to provide for the delivery of water to each individual tract down to 5 acres where necessary. During the spring of 1913 this work was commenced, and 15,000 linear feet of iron pipe were purchased and shipped to the project. Numerous wooden take-outs and other structures were built, and 3,450 feet of pipe trench and 1,125 feet of class C ditch excavated.

Future work.—During the next fiscal year the concrete lining of canals will be continued; also the improvements of Salmon Lake reservoir. A cast-iron outlet gate and concrete gate tower will be installed, and the deepening of the outlet channel in the lake above the outlet will be completed, which, with the work already done, will provide 600 acre-feet additional storage. For the extension of the distribution system additional pipe will be laid, and such structures as may be necessary for the measurement of the water to the lands served thereby will be built. The farmers' sublaterals previously constructed by individual water users will be taken over and operated by the United States as part of the scheme for delivering water to each farm.

OPERATION AND MAINTENANCE.

The irrigation season of 1912 began with the turning of water into the canals on May 18. The system was operated only 89 days during the season, which closed September 1. The season throughout was favorable for farming operations on account of abundance of rain and lack of excessively hot weather. On account of the unusual rains deliveries of water were frequently suspended for a number of days at a time at the request of the water users. During the season the entire distribution system, including 46 miles of canals, was operated and 7,260 acres of land were irrigated, or 73 per cent of the irrigable area of the project. Water was delivered to 432 farms, aggregating 8,505 acres of irrigable land. During the season 17,319 acre-feet of water were diverted from Salmon Creek and 9,040 acre-feet delivered to the lands irrigated, or 1.24 acre-feet per acre. This amount of water is only one-half of that to which the water users are entitled under their contracts, but proved to be ample, in view of the bounteous rains. The seepage and evaporation loss from the project canals amounted to 45 per cent of the total amount of water diverted. This was 7 per cent less than the loss reported for 1911 and is due to the concrete lining of canals done between the two irrigation seasons. The run-off of Salmon Creek for 1912 was 21,110 acre-feet, which is considerably below normal, but exceeded that for the two years previous or since the entire project has been operated. This run-off proved to be in excess of that required for the operation of the system, as 2,000 acre-feet remained in storage at the end of the irrigation season.

The rotative system of delivery was practiced throughout the season, and has been found to be the most satisfactory for all-around purposes, as it tends to cut down the seepage losses and also gives the water user a "double head," or twice his normal flow, thus enabling him to get over his ground quicker than with a single head. The system was operated with no washouts of any consequence or any

other serious trouble throughout the season. The best crops of any year since the inception of the project were grown in 1912. Water was plentiful and rains fell often; consequently the complaints received were fewer in number and much less insistent than during former years.

The season of 1913 also had an auspicious beginning. The snowfall in the mountains during the winter was greater than usual and the spring was backward; consequently when warm weather began the run-off into the reservoir was heavy. Rains during the months of May and June have also been greater than normal, all of which has produced the largest inflow into the reservoir in the history of the project. At the close of the fiscal year the storage for the project amounted to 13,000 acre-feet, which is about 3,000 acre-feet in excess of the previous high-water mark of 1912. Water for the irrigation season of 1913 was turned into the canals on May 7, but during the remainder of the month and the month of June the demands for water were small on account of the frequent rains, and for this reason the system was entirely closed down several times during these two months. The number of farms irrigated on the project this year is about the same as during 1912, being 440, but the area irrigated has increased about 500 acres, amounting to a total of 7,730 acres.

For " Summary of operation and maintenance results," see Appendix, p. 334.

The following historical review contains statistical data relating to the project for the years from 1909 to 1913, inclusive:

Historical review, Okanogan project.

Item.	1909	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	4,550	9,500	10,051	10,051	10,071
Acreage irrigated	3,690	4,421	6,467	7,260	7,730
Number of farms irrigated	196	259	339	432	440
Miles of canal operated	41	41	41	46	47
Water stored (acre-feet) total	[1] 5,000	18,270	15,810	21,110	14,250
Water diverted (acre-feet)	[1] 15,000	17,280	16,290	17,319	4,900
Water delivered to land (acre-feet)	[1] 9,000	9,300	6,119	9,040	2,900
Water delivered per acre of land irrigated (acre-feet)	[1] 2.50	2.46	1.18	1.24	.47

[1] Estimated.

SETTLEMENT.

During the past three years there has been very little change in the number of settlers under the project, and the amount of land changing hands has decreased each year. This has been due partly to the fact that the project has been isolated on account of lack of proper transportation facilities and consequent lack of adequate markets for the produce raised. In spite of the fact that the settlers have worked hard and spent all their money in improving their land, prices have actually decreased in a good many instances, and are now at about a normal figure. During 1910 the Great Northern Railway Co. graded a roadbed for a branch line running south from Oroville past the lands of the project on the east side of the Okanogan River as far as the town of Pateros. In 1912 the extension of this grade to the main line of the railroad at Wenatchee

was commenced. Early in the year 1913 the laying of steel rails on the north end of the grade was started at Oroville, and by June 1 the track had been completed for a distance of 50 miles south from Oroville, which is beyond the boundaries of the Okanogan project, and train service was instituted on June 2. This track will be extended to Wenatchee and train service instituted before the close of the current year. This will enable the settlers to transport the produce raised during 1913 to markets and should enable them to improve their financial condition. The settlers as a rule have not been discouraged by the low prices obtained for their products during the past years, and especially in 1912, and are determined to improve their lands to the highest possible state of productivity.

PRINCIPAL CROPS.

During 1913 a number of the earlier orchards planted on the project will come into bearing, and it is estimated that a good yield will be secured of various soft fruits, such as apricots and peaches. All young orchards are in good condition where they have been properly cared for, and it is expected that a fair crop of apples will also be harvested. The tendency is, however, toward increasing the production of winter apples, and decreasing the production, for commercial purposes, of all other varieties of fruit throughout the project. This is due to the large acreage elsewhere which produces excellent qualities of soft fruits, and to the belief that the Okanogan Valley produces a grade of winter apples which can not be excelled anywhere. During 1912, 3,280 acres, comprising 284 farms, were cropped, the principal items of which are shown in the following table:

Crop statistics, Okanogan project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa, grain, hay	1,051	Ton	2,714	$27,140
Berries, truck	200			8,340
Beans	30	Pound	16,330	980
Corn	830	Bushel	21,900	21,940
Carrots	19	Ton	135	1,210
Fruit	1,042	Pound	822,955	29,310
Nursery stock	50			3,600
Onions	4	Ton	18	540
Potatoes	320	Bushel	37,300	22,380
Timothy, clover	270	Ton	380	4,560
Less duplicated areas	536			
Total cropped	3,280			120,000
Other purposes	3,980			
Total irrigated	7,260			

ORDER DATED JULY 6, 1912.

Whereas, in pursuance of the acts of Congress approved June 17, 1902 (32 Stat., 388), and February 13, 1911 (36 Stat., 902), an order was promulgated on April 29, 1912, for the Okanogan project, Washington, granting under the conditions therein set forth a further stay of proceedings for the cancellation of entries and water-right applications; and

Whereas the amendatory contract with the Okanogan Water Users' Association was executed June 22, 1912, to cover proposed improvements specified in said order, and the time remaining as set forth in paragraph 6 of said order is not sufficient for the formal execution and recording of contracts for covenants running with the land to secure proper applications for water rights and it is necessary to extend the time for the execution and recording of said contracts; and

Whereas it is deemed advisable to announce at this time the maximum building charge to be inserted in said contract:

Now, therefore, in pursuance of the said acts of Congress:

1. All entries and water-right applications hereafter made without valid written assignment of credits for payments theretofore made shall be subject to a building charge of not to exceed $110 per acre pending the issuance of public notice providing therefor, and such entrymen and applicants may receive water upon payment of the rental charges provided for in order of April 29, 1912, or which may be hereafter announced.

2. Paragraph 6 of said order is hereby amended so that the time limit for the formal execution and recording of contracts containing covenants running with the land, to secure proper applications for water rights, shall be August 1, 1912, instead of July 1, 1912.

SAMUEL ADAMS,
First Assistant Secretary.

ORDER DATED JUNE 16, 1913.

In pursuance of the acts of Congress approved June 17, 1902 (32 Stat., 388), and February 13, 1911 (36 Stat., 902), and other acts applicable thereto, the following order is hereby promulgated for the Okanogan project, viz:

1. For all entrymen and water-right applicants who availed themselves of the stay of proceedings offered by order of April 29, 1912, the water rental charge for the irrigation season of 1913 and annually thereafter until further notice shall be $3 per acre of irrigable land. Such rental shall be due on May 1 of each year, and no water will be furnished in any year until payment thereof shall have been made.

2. The payment of such rental charge annually until further notice shall operate to continue in effect the stay of proceedings duly accepted in pursuance of order of April 29, 1912.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, Okanogan project, June 30, 1913.

ASSETS.

Accounts receivable:		
Water rentals	$2,193.00	
Water right, building charges	52,387.70	
Water right, operation and maintenance charges	150.50	
		$54,731.20
Inventories:		
Equipment in use—		
Animals	$620.00	
Mechanical and other	6,661.70	
	7,281.70	

Inventories—Continued.			
Materials in storehouse		$933.15	
Cement		1,457.86	
Structural iron and steel		531.57	
Lumber		356.36	
Explosives		65.20	
			$10,625.84
Improvements to land:			
Gross cost		631,594.68	
Less credits from incidental operations—			
Rental of cottages	$660.00		
Rental of grazing lands	936.50		
Rental of irrigating water	1,670.50		
Loss on mess house	[1] 193.83		
		3,073.17	
			628,521.51
Total assets			693,878.55

LIABILITIES.

Accounts payable:			
Labor		144.30	
Purchases		1,182.29	
Freight and express		1,611.32	
Passenger fares		11.45	
			2,949.36
Reserves:			
Reserve for amortization of original cost by repayment—			
Building charges accrued		68,228.40	
Building advance collections		8,111.00	
			76,339.40
Unadjusted credits, net earnings, Government animals			471.08
Net investment:			
Disbursement vouchers	684,053.52		
Transfers received	25,274.29		
		709,327.81	
Less—			
Collection vouchers	116,434.27		
Transfers issued	10,240.21		
		126,674.48	
			582,653.33
Excess, operation and maintenance			31,465.38
Total liabilities			693,878.55

Feature costs, Okanogan project, to June 30, 1913.

Storage works:		
Salmon Lake Reservoir	$7,029.13	
Conconully Reservoir	328,169.26	
		$335,198.39
Diversion system:		
Weir	4,115.56	
Main Canal, main laterals, and sublaterals	271,490.29	
		275,605.85
Roads (highways to dam site)		1,096.05
Buildings		7,200.00
Telephone system		6,001.20
Farm unit survey of irrigable lands		1,889.92
Colville extension, examination		4,603.27
Total building cost		631,594.68

[1] Deduct.

Operation and maintenance:		
Salmon Lake Reservoir	$195.30	
Conconully Reservoir	5,451.77	
Diversion system	42,581.55	
Headquarters	6,063.69	
Telephone system	393.54	
Inventory of cost ledger supplies	261.14	
		$54,946.99
Total building and operation and maintenance cost		686,541.67

Operating revenues and expenses, Okanogan project, to June 30, 1913.

EXPENSES.

Carriage:		
Operation	$2,533.83	
Maintenance	435.82	
		$2,969.65
Distribution:		
Operation	14,578.23	
Maintenance	7,763.93	
		22,342.16
Undistributed expenses		29,635.18
Excess revenues over costs		31,465.38
		86,412.37

REVENUES.

Operation and maintenance accruals	34,566.87
Rental of irrigation water	51,845.50
	86,412.37

Estimated cost of contemplated works, Okanogan project.

Improvements, Salmon Lake Reservoir	$1,200.00
Robinson Flat pumping plant	79,000.00
Concrete lining of canals	79,606.91
Extension distribution system	62,991.62
Total estimated cost of contemplated works	222,798.53

WASHINGTON, YAKIMA PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Yakima, Benton, and Kittitas.

Townships: 8 to 22 N., Rs. 11 to 25 E., Willamette meridian.

Railroads: Northern Pacific; Chicago, Milwaukee & St. Paul; Oregon-Washington Railroad & Navigation Co.

Railroad stations and estimated population January 1, 1913: Grandview, 700; Sunnyside, 1,400; Outlook, 150; Granger, 500; Zillah, 400; Mabton, 700; Byron, 50; Prosser, 1,400; Ellensburg, 5,000; Thorp, 300; Yakima, 200; North Yakima, 16,500; Naches, 150; Wapato, 500; Toppenish, 1,700; and Parker, 50.

WATER SUPPLY.

Source of water supply: Yakima River and tributaries.

Area of drainage basin: 5,270 square miles.

Annual run-off in acre-feet of Yakima River at Union Gap, 3,300 square miles; 1897 to 1912—maximum, 4,370,000; minimum, 2,390,000; mean, 3,320,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1913: Sunnyside unit, 80,608 acres; Tieton unit, 34,537 acres.

Area under water-right applications and rental contracts, season of 1913: Sunnyside unit, 70,722 acres; Tieton unit, 23,225 acres.

Length of irrigating season: Sunnyside unit, April 1 to October 31, 214 days; Tieton unit, May 1 to October 1, 153 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Average annual rainfall in irrigable area: At Sunnyside, from 1895 to 1912, 6.54 inches; for 1912, 8.64 inches. At North Yakima, from 1909 to 1911, 5.74 inches; at Tieton, for 1912, 10.30 inches.

Range of temperature on irrigable area: —21° to 110° F.

Character of soil of irrigable area: Sunnyside unit—on about three-fourths of the unit the soil is sandy loam or volcanic ash from 10 to 60 feet deep. The remainder is decomposed basalt, underlain by gravel or a combination of this with the above-named soils. Tieton unit—volcanic ash.

Principal products: Forage, hops, vegetables, and fruit.

Principal markets: Seattle, Tacoma, and Spokane, Wash., and eastern cities.

LANDS OPENED FOR IRRIGATION.

SUNNYSIDE UNIT.

Dates of public notices: November 18, 1908; March 2, 1909; April 18, 1910; May 2, 1910; March 15, 1911; February 29, 1912; May 31, 1912; June 16, 1913.

Location of lands opened: Ts. 8 to 11 N., Rs. 19 to 25 E., Willamette meridian.

Present status of irrigable lands opened: 1,411 acres entered subject to reclamation act; 576.75 acres of State lands; 78,620 acres in private ownership.

Duty of water: 3 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: $52.

Annual operation and maintenance charge: $0.95 per acre of irrigable land.

TIETON UNIT.

Dates of public notices and orders: November 7, 1910; March 8, 1911; April 14, 1911; January 24, 1912; February 21, 1912; April 18, 1912; May 10, 1912; March 21, 1913; April 25, 1913; June 16, 1913.

Location of lands opened: Ts. 12 to 15 N., Rs. 16 to 19 E., Willamette meridian.

Present status of irrigable lands opened: 1,563.33 acres entered subject to the reclamation act; 612.33 acres open to entry; 2,274 acres of State lands; 329 acres railroad land; 29,759.04 acres in private ownership.

Duty of water: 2.17 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Building charge per acre of irrigable land: $93.

Annual operation and maintenance charge: $1.50 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys in 1903.

Report of board of engineers recommending construction October 16, 1905.

Construction of Sunnyside and Tieton units authorized by Secretary December 12, 1905; Wapato unit, June 16, 1906.

Sunnyside Canal purchased June 23, 1906.

Lake Kachess Dam (temporary crib) purchased December 12, 1906.

Lake Keechelus Dam (temporary crib) completed April, 1907.

First irrigation by Reclamation Service, Sunnyside unit, season of 1907.

Sunnyside diversion dam reconstruction completed October, 1907.

Lake Clealum Dam (temporary crib) completed November, 1907.

Tieton diversion dam completed December, 1908.

Tieton Main Canal completed in 1909.

Construction Lake Kachess permanent dam begun in May, 1910.

Bumping Lake Dam completed in 1910.

First irrigation by Reclamation Service, Tieton unit, season 1911.

Enlargement Sunnyside Main Canal completed October 1, 1911.
Distribution system, Sunnyside unit, completed in 1911.
Tieton unit completed winter 1911–12.
Westcott timber-cutting contract, Lake Kachess, suspended April 27, 1912.
Kachess Dam completed fall of 1912.
Warren Act contract with Kittitas reclamation district executed by Secretary of Interior January 18, 1913.
Allotment for construction Keechelus Dam approved by President February 21, 1913.
Extension of time of withdrawal of waters of Yakima watershed to January 1, 1914, granted by State commissioner of public lands on February 19, 1913.
Construction of McAllister Meadows wagon road begun in June, 1913.
Per cent completed June 30, 1913: Storage unit, 20 per cent; Sunnyside unit, 89 per cent; Tieton unit, 94 per cent.

IRRIGATION PLAN.

The irrigation plan of the Yakima project provides for the storage of flood waters of the Yakima River and its tributaries in Kachess, Keechelus, Clealum, and Bumping Lakes, and in a reservoir at McAllister Meadows; the diversion of water from the Yakima River for the irrigation of 62,000 acres of land on both sides of the river in the vicinity of Ellensburg, comprising the Kittitas unit; the diversion of water from the east bank of the Yakima River near Parker for the irrigation of 100,000 acres of land by means of the old Sunnyside Canal, as improved and extended by the Reclamation Service, comprising the Sunnyside unit; the diversion of water from the Tieton River below McAllister Meadows for the irrigation of 34,700 acres of land lying between the Naches River and Ahtanum Creek in the vicinity of North Yakima, comprising the Tieton unit; and the diversion of water from the west bank of the Yakima River near Parker for the irrigation by means of the canal system of the Yakima Indian Reservation, as improved and extended by the Reclamation Service, of 106,000 acres of land by gravity and 14,000 acres of land by pumping with power developed at drops in the canals, comprising the Wapato unit. The plan also provides for the development of power from drops in the main canals and laterals of the Sunnyside and Tieton units to be used for pumping irrigation water and for other purposes. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The following features of the above plan have been completed: Sunnyside unit, diversion dam, enlargement of main canal, Sulphur Creek wasteway, and the distribution system, with the exception of small laterals to lands not yet applied for and the substitution of permanent for temporary structures in larger laterals. Tieton unit, Bumping Lake storage dam, diversion dam, main canal, and distribution system. Storage unit, Kachess Dam; construction work is in progress on Keechelus Dam, the clearing of the reservoir sites at Bumping Lake and Lake Kachess, and the extension of the wagon road from Tieton main canal headworks to the site of the permanent dam at McAllister's Meadows. The features for future construction are: Pumping plants and necessary distribution systems on the Sunnyside unit, Clealum and McAllister Meadows Reservoirs, and Tieton River storage.

CONSTRUCTION DURING FISCAL YEAR.

STORAGE UNIT.

General.—On the eastern slope of the Cascade Range are located the lakes which, when the waters are impounded, will be the water supply for the lands in the Yakima project. Prior to this year the Bumping Lake Reservoir was completed, and during the year the Kachess Dam and appurtenant structures were finished and construction of Keechelus Dam commenced.

KACHESS DAM.

Description.—The Kachess Dam is located on the Kachess River, about 1,700 feet below the most southerly point of Lake Kachess. It is an earth dam 1,400 feet long, maximum height 60 feet, and contains 182,000 cubic yards of material. The top width is 20 feet, upstream slopes 3 to 1, downstream 2 to 1. A wide cut-off trench was excavated about 20 feet deep upstream from the center line and parallel with it at a distance of 20 to 60 feet. A narrow trench was excavated in the bottom of this trench to a depth of from 35 to 60 feet below the ground surface, in which was built a concrete core wall 2 feet thick. The outlet works consist of 1,200 feet of open channel, extending from deep water in the lake to the intake of a cut-and-cover section 1,400 feet long. This section consists of a 9 by 10 horseshoe type conduit placed in a trench, varying in depth from 30 to 55 feet. The water is discharged from this conduit into an open channel section 300 feet long, and from this into a 12 by 12 horseshoe type conduit section 300 feet long lying under the dam. An open-channel section 700 feet long connects this conduit with the Kachess River. A spillway is located at a distance of about one-half mile from the east end of the dam in a low saddle in the ridge. The length of the weir crest is 250 feet, designed to carry 7,200 second-feet with a head of 4 feet.

Outlet works.—Previous to the fiscal year ending June 30, 1913, the outlet works were completed, except for the finishing of the lake outlet channel, concrete gate tower, installation of gates and operating machinery, and some paving on the side slopes of the channel below the dam. Completing the lake outlet channel required the excavation of 38,000 cubic yards of material by means of an orange-peel excavator mounted on a raft. The installation of the gates and operating machinery required the setting of six 4 by 10 cast-iron sluice gates and stands mechanically operated by shafting and gears, the power being furnished by a small turbine located within the tower. A small amount of dry and mortar paving was placed on the side slopes of the channel, which completed this work.

Body of dam.—The cut-off trench, core-wall trench, and core wall were completed prior to July 1, 1912. The construction of the embankment was commenced in April, 1912. Practically all the material was obtained from two borrow pits, one located at the east end and one about one-half mile southeast of the east end of the dam. The material was all hauled in 1½ cubic-yard dump cars in trains of from 12 to 15 cars drawn by 9-ton dinkey locomotives. A 45-ton steam shovel worked in the pit, which furnished the tight material for the upstream portion of the embankment, and a 65-ton drag-line excavator loaded the material from the gravel pit. Two eight-hour shifts were used on the shovel, the maximum output per 24 hours being 2,200 cubic yards. The average length of haul was 1,100 feet. The drag-line excavator worked principally one shift, two shifts being used for only a short period. The maximum output for 24 hours with two eight-hour shifts was 1,400 cubic yards and the average length of haul 3,500 feet. After the material was dumped from a trestle built on the center line and to the top of the dam, it was spread with fresnoes, sprinkled, and rolled with a 28-ton traction engine with extension drive wheels. The rocks suitable for rip-

rap, obtained from the embankment material, were hauled to the upstream slope of the dam and placed, forming a 2-foot layer of riprap. One hundred and three thousand cubic yards of material, embankment measurement, were placed during the year.

Spillway.—The construction of the spillway was approximately 45 per cent completed at the beginning of the year. The excavation was carried on intermittently as the teams could be spared from the embankment feature. After the concreting of the outlet works was completed the plant was moved to the spillway, where approximately 1,400 cubic yards of concrete were placed, finishing the spillway in October, 1912.

Summary.—At the end of the fiscal year the Kachess Dam and appurtenant structures were 95 per cent completed. The principal items of work accomplished were:

	Cubic yards.
Excavation	149,052
Embankment	103,197
Backfill conduit trenches	737
Concrete, plain	1,489
Concrete, reenforced	36
Paving, dry	1,424
Paving, mortar	317
Riprapping	7,456

KEECHELUS DAM.

Description.—Keechelus Dam is located at the foot of Lake Keechelus, which is the main source of the Yakima River. It is to be of the earth and gravel type, 6,400 feet long, maximum height of 68 feet, and will contain approximately 550,000 cubic yards of material. The top width will be 20 feet, 3 to 1 upstream and 2 to 1 downstream slope. A wide cut-off trench will be excavated and a concrete core wall placed where the looseness of the material makes this construction necessary. The present lake level will be lowered 50 feet by means of the outlet works, which will be 7,000 feet long, 3,000 feet of which will be a 10 by 10 horseshoe-type tunnel, and the remainder open channel section. A spillway with a crest length of 300 feet, which will discharge 10,000 second-feet with a 4.5 foot head, will be located at the north end of the dam and adjacent thereto.

Body of dam.—Active construction work began August 8, 1912. A camp to accommodate about 100 men was erected and the clearing of the dam site started. In connection with the construction of roads a few small areas were grubbed and stripped, the material being used on the roads. The camp was closed down in December, 1912, but opened up again in March, 1913. At the end of the fiscal year the clearing had been finished, the grubbing 66 per cent completed, and the stripping 50 per cent completed.

Outlet works.—In May, 1913, work was started on excavating the shafts for the tunnel work. The shaft at the lower portal was abandoned after encountering very heavy ground. The shaft near the upper end of the tunnel is about completed. An adit was started about 1,100 feet from the lower end, working in from the river, a distance of about 130 feet from the tunnel, and at the end of the year was about 25 per cent completed. No work has been done on the tunnel section to date. Below the outlet tunnel is an open channel approximately 3,000 feet long, with 20-foot bottom width and 1½ to 1

slopes. Early in April the excavation of this trench was started with a 65-ton dragline excavator. The material is being wasted on the river side of the channel to form a dike, thus protecting the channel from the overflow from the spillway which has to pass down the river. This work is about 10 per cent completed.

Spillway.—In May, 1913, the clearing and grubbing was done on the spillway site, and excavation started the next month. The material is being handled by hand into 1½ cubic yard dump cars. The material excavated overlies a rock point and is being excavated to allow the rock to be quarried to crush for concrete aggregate.

General.—Since March, 1913, an excellent camp has been erected to accommodate about 600 men. The sanitary conditions are being looked after very carefully by providing steel bunks and mattresses for the bunk houses, sewer system, and a pure and adequate water supply. A small power plant, which will furnish about 400 horsepower to be used during construction, is about completed. At the end of the fiscal year the Keechelus dam and auxiliary structures were 12 per cent completed. The principal items of work accomplished were: Clearing, 96 acres; grubbing, 33 acres; excavation, 53,000 cubic yards.

LAKE CLEALUM.

A few repairs were made to the rock-filled crib dam at Lake Clealum. A rock-filled timber crib was placed below and to one side of the outlet gates, through the dam, to protect the bank against wash when heavy flow of water is passing through the gates.

CLEARING RESERVOIR SITES.

Surrounding Bumping Lake, Lake Keechelus, Lake Kachess, and Lake Clealum are good bodies of merchantable timber, which will be submerged by the raising of the water surface when permanent dams are constructed. Contracts for the removal of this timber were made under date of February 6, 1909, as follows:

Lake Keechelus, Flanagan Mining Co., estimated value about	$82,000
Lake Kachess, F. C. Westcott, estimated value about	15,000
Lake Clealum, Joseph F. Walsh, estimated value about	40,000

Bumping Lake: No bids were received for the timber around this lake, and the work is being done by the United States. Lake Keechelus: The Flanagan Mining Co. began work about May 20, 1909, the first steps being to establish a sawmill on the west shore of Lake Keechelus. Very little progress has been made under this contract. On June 30, 1913, approximately 900,000 feet, board measure, of timber had been cut, the area cleared amounting to approximately 32 acres. Lake Kachess: Contractor Westcott made no attempt to carry out the terms of his contract, and on April 29, 1912, was notified that the contract was declared suspended. Clearing operations have since been carried on by the United States, and at the end of the fiscal year approximately 1,500,000 feet, board measure, of timber had been cut and the logs either skidded to the lake or bucked up and left in the woods for future disposal. The area cut over has included that portion at the lower end of the lake adjacent to the dam. Lake Clealum: Contractor Walsh began work during July of 1909,

establishing a sawmill at the lower end of the lake. Fair progress has been made under this contract. On June 30, 1913, approximately 4,200,000 feet, board measure, of timber had been cut, the area cleared amounting to about 200 acres.

SUNNYSIDE UNIT.

Main Canal.—Work on the enlargement of the Main Canal was continued by teams during the winter of 1912–13, and consisted of the removal of comparatively small amounts of material at different places along the canal to complete the enlargement to the final section. The work was done by two team camps, which moved from place to place as occasion required, and consisted of the removal of some 6,000 cubic yards of earth and 500 cubic yards of rock. Work was also done on the Main Canal banks at the various fills, where widening and strengthening was necessary to insure the safety of the fill. The work of enlargement and bank strengthening was done at scattered points along the canal from mile 2 to mile 48. Three concrete turnouts for laterals of 10 second-feet capacity or greater and 11 combination steel and concrete turnouts for laterals of less than 10 second-feet capacity were installed between miles 13 and 52.

Snipes Mountain division.—The enlargement of Snipes Mountain lateral was completed from mile 9 to mile 10.2, and additional work on the enlargement was done between miles 2.5 and 3. At mile 9 concrete headworks were installed for the South Branch lateral, consisting of the headworks itself, of reenforced concrete, and a concrete-lined chute, 600 feet long, with a rock-paved section at its outlet.

Rocky Ford lateral.—Four paved rock drops were constructed in the Rocky Ford lateral between the headworks and mile 2. The lateral was enlarged to final capacity from the headworks to mile 3.3, and at mile 3.3 diversion works were constructed, whereby the whole of the flow of water in the Rocky Ford lateral can be turned into a natural drainage channel in case of emergency.

General distribution system.—Work on the general distribution system still necessary for its completion consists of the building of small laterals, pipe lines, and flumes for the delivery of water to farm units. The policy now is to do such of this work as is called for when application is received for water on the farm unit; and during the fiscal year some 10 or 12 turnouts were installed, necessitating the construction of additional sublaterals, pipe lines, and small flumes. The map for the distribution system as now constructed was completed.

TIETON UNIT.

Distribution system.—A five-room frame cottage for patrolmen was built by contract during March and April of the present year. The siphon required rather extensive repairs owing to the action of the frost on the concrete pipe section during the previous winter; these repairs consisted of a heavy concrete covering to replace the frosted portion and a careful washing of the inner surface with neat cement.

Tieton River storage investigations.—During August, 1912, a party of four men was in the field making preliminary investigations for temporary storage for the Tieton unit. Five dam sites were investigated on the Tieton River and its tributaries. The most feasible site found appeared to be on the Tieton River at the mouth of Clear Creek, about 8 miles above the site of the McAllister Meadows permanent dam. Further investigations at this point for foundation and reservoir will be needed before a final determination of the feasibility of this site can be made.

Bumping Lake.—The construction of the Bumping Lake dam was practically completed in 1910. During 1911 and to June 30, 1912, the clearing of the reservoir area was continued. After the latter date a small crew of about 20 men was kept at the lake, engaged principally in hauling logs out of the lake with a donkey engine, piling and burning them. No timber was cut, the work being confined to removing that cut during the previous year. About November 15 the weather became so bad that operations were discontinued for the season. The clearing operations were resumed May 6, 1913, the first work consisting of repairs to the road and the establishment of camp. Timber cutting began about the 25th and continued until June 12, when the rising water prevented further cutting and the crew of 20 men was engaged in piling and burning the logs taken from the lake by means of the donkey engine. The crew will later be enlarged when the lake surface is lowered sufficiently by the release of storage to afford an opportunity to resume the cutting of timber.

OPERATION AND MAINTENANCE.

SUNNYSIDE UNIT.

Operation.—The operation of the Sunnyside Canal and distribution system, from July 1, 1912, to November 1, 1912, the close of the irrigation season, was entirely successful. From April 1 to July 1, 1913, operation has been carried on with but one accident along the Main Canal and one on the Rocky Ford lateral. That on the Main Canal was a break near mile 56, on the night of April 12, occurring somewhere about midnight, and discovered about 2 a. m. So far as could be determined by an inspection at the site of the break, it was caused by the water reaching a rat hole in the canal bank. By prompt use of the Sulphur Creek wasteway and the blow-off valves in the Mabton and Prosser siphons, the water in the Main Canal was lowered so that repairs were commenced the next morning about 8 o'clock, and by 1 o'clock the water was flowing past the break. There was little or no interruption to water delivery above mile 51 and conditions were normal throughout the entire system by April 14. Little or no damage was done because of the break, due to the fact that all land affected is yet in sage brush. The break in the Rocky Ford lateral occurred on the night of May 29 at the diversion works, mile 3. The water reached a rat hole near the top of the dam at this point and broke through sweeping down the drainage channel to the river. No serious damage was done to crops or roads, and the accident resulted only in keeping the Rocky Ford lateral dry below mile 3 for a period of three days, during which time the repairs were made.

Water was turned into the canal, for priming and puddling, the latter part of March, and by April 2 deliveries were made as called for. The demand during the first half of April was light, and difficulty was experienced in maintaining a sufficient level in the canal to serve the high deliveries without having a surplus at the lower end. There have been comparatively few complaints regarding delivery or condition of the deliveries, and all complaints have been investigated, and, where found worthy, remedied within 36 hours of receipt at the office. The maximum head of water diverted at the headworks during the year was 938 second-feet, and the average diversion 735 second-feet. The actual delivery of water to lands was 3.10 acre-feet. Water is now being delivered to 62,800 acres, while the total area for which water is now available from the Sunnyside Canal is 80,607.61 acres, classified as follows:

Kind of water right.	Acres.	Rate.	Amount.
Konewock	3,080.00	Free.	
Washington Irrigation Co	16,788.27	$1.00	$16,788.27
Do	912.16	.50	456.08
Do	34.80	1.50	52.20
Washington Irrigation Co. and additional Government water right	26,410.38	.95	25,089.86
Declared available by public notice	33,382.00	.95	31,712.90
Total	80,607.61		74,099.31

In addition a small acreage is being served with water upon a rental basis.

Maintenance.—Maintenance work has consisted of the necessary cleaning of canals and laterals and the repairs and renewals of measuring boxes and structures.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Sunnyside unit, Yakima project.

Item.	1909	1910	1911	1912	1913[1]
Acreage for which service was prepared to supply water	58,360	61,245	71,756	80,076	80,608
Acreage irrigated	44,375	48,255	51,040	55,800	62,800
Number of farms irrigated	1,600	1,818	2,221	2,441	2,450
Miles of canal operated	400	434	500	513	525
Water diverted (acre-feet)	245,851	262,008	275,465	314,733	312,032
Water delivered to land (acre-feet)	154,427	158,611	157,419	179,308	194,725
Water delivered per acre of land irrigated (acre-feet)	3.480	3.287	3.084	3.213	3.101

[1] Estimated.

TIETON UNIT.

Irrigation was first begun on May 4, 1910, flood water being delivered to approximately 1,700 acres of land under rental contracts in what is known as unit one. No storage water was available during 1910, and it became necessary to close down the canal when the flow of the Tieton River reached a point where its entire flow was necessary to supply prior appropriations. The Bumping Lake Dam was completed in 1910 and in 1911 31,800 acre-feet of water were stored, making possible continuous irrigation throughout the season, from May 1 to September 30, inclusive.

In 1911 units one and two were formally opened under public notice and water was served to 7,190 acres of land under regular water-right applications. A system of delivery on demand was used, the delivery being made in an intermittent flow, four service periods being the general rule, and the delivery amounting to 1.91 acre-feet per acre for the season.

In 1912 unit three was formally opened under public notice, making the entire project subject to water service under the regular water-right applications. During 1912 the system of delivery was the same as that used during 1911, water being delivered in an intermittent flow and on demand. The main canal and distribution system were operated throughout the season, from May 1 to September 30, inclusive, with the exception of four days in July, when the entire system was turned off in order to do some cleaning and repair work on the diversion dams along the North Fork Channel. Only one break of any importance occurred, this being in a main lateral just below the wasteway on the south fork of Cowiche Creek. The water was turned through the wasteway while the repairs were being made, which required a period of 24 hours. The cost amounted to approximately $100, no damage having resulted to farm lands. Complaints relative to water delivery were few, and in no case was there shown actual damage from insufficient water supply.

At the end of the fiscal year 1913 the total area for which water is available had been reduced to 34,537 acres by various amendments to farm-unit plats. Of this area 18,283 acres were receiving water, and on approximately 10,000 acres of the best-developed land water is being delivered on a rotation schedule of 5 days on and 10 days off. On the remainder of the project the delivery is still being made on demand. During the season of 1913 the main canal and distribution system have been in operation without interruption, no breaks having occurred. It is estimated that 20,000 acres will be irrigated during the season.

For "Summary of operation and maintenance results," see Appendix, p. 334.

Historical review, Tieton unit, Yakima project.

	1910	1911	1912	1913, to June 30.
Acreage for which service was prepared to supply water	10,082	19,378	34,700	[1]34,537
Acreage irrigated	1,695	7,190	15,008	18,283
Number of farms irrigated	73	438	875	1,000
Miles of canal operated	75	166	335	335
Water stored (acre-feet) on June 30	.....	31,800	31,800	31,800
Water diverted (acre-feet)	7,830	22,698	47,046	22,153
Water delivered to land (acre-feet)	2,932	13,733	34,445	15,985
Water delivered per acre of land irrigated (acre-feet)	1.73	1.91	2.27	.94

[1] Reduction of acreage due to amendments to farm-unit plats.

SETTLEMENT.

SUNNYSIDE UNIT.

The general development and growth of the district irrigated by the Sunnyside Canal has been steady during the past year. The new development has been confined largely to the Prosser and Mabton

districts, and there has been less immigration than at any time during the past six or seven years. Good progress, however, has been made by the settlers on the ground in developing their holdings, and with few exceptions they are in a position to secure good crops and expect reasonable returns. There has been little growth in the towns and villages during the year, but several permanent improvements are noted on the older farms. Permanent roads are being built and there has been a great deal of activity in the construction of trunk drains by drainage districts organized under the State law. The estimated population on farms of the Sunnyside unit is 7,500. There were in 1910, 1,818 farms under irrigation; in 1911, 2,221; and in 1912, 2,441. There have been comparatively few sales, and it is believed that for the most part the present population is permanent. There have been no relinquishments of homesteads.

TIETON UNIT.

The number of farms irrigated during the past three years was as follows: 1910, 73; 1911, 438; 1912, 875; 1913, estimated at 1,000. A census of the population for 1912 showed 1,174 people living on the farms. A large part of the Tieton lands is being farmed by people living in near-by towns, who hire their farm work done, being engaged in business or working for salaries to keep up their living and development expenses. This condition is due partly to the fact that a large part of the lands has been set to fruit trees, which will not yield an income until several years' growth has been attained. It is believed that as the lands are further developed and the income from farm products is increased, a larger per cent of the landowners will make their permanent homes on the project. At the present time considerable land in private ownership is being offered for sale. There are still 2,603 acres of State and railroad lands under the project which have not been sold to settlers.

PRINCIPAL CROPS.

SUNNYSIDE UNIT.

The principal crops grown are fruits, including peaches, apples, pears, cherries, grapes, melons, etc.; forage crops, consisting principally of alfalfa, timothy, and clover or grain hay; and vegetables, of which potatoes are the principal crop, while cabbage, asparagus, tomatoes, eggplant, onions, and other garden products are being planted in increasing quantities as their value and the methods of handling become better known. The fruit crop for the year 1912 was the largest ever produced in the valley. The acreage planted to potatoes in 1912 was almost two and a half times that of the previous year, and an excellent crop was secured. Alfalfa hay, which has formerly been exported to a large extent, brought prices below the average during the fall and winter, but in the spring, on account of a large increase in the dairy herds of the valley, the price rose to $10 per ton, and will probably remain in that neighborhood. Dairying, with hog raising as a side issue, is attracting a great deal of attention and will probably be the means of establishing a fair market value for the forage in the country. Corn is being raised successfully

and will afford the necessary feed to finish the local hogs for the market.

The total estimated crop returns for the Sunnyside unit in the year 1912 were $3,158,857, being an average return of $69 for each acre irrigated, or practically $50 per acre for each acre to which water was delivered. The average returns for each farm were approximately $1,290. The crop yields referred to cover a large area of land which has been farmed under the old water rights for from 5 to 15 years, which, of course, produces above the average, while the new farms, which have been placed under cultivation during the last two to four years, probably did not produce an average of more than $30 per acre during the past year. The crop prospects for 1913 are good. The first cutting of alfalfa was all in the stack by June 25, with practically no damage, and the prevailing market price is $10 per ton, an advance of about $1 per ton over the price at this time in

Crop statistics, Sunnyside unit, Yakima project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	24,338	Tons	133,853	$870,044
Apples	4,898	Pounds	74,746,400	1,143,523
Pears	472	do	6,061,640	133,772
Peaches	995	do	13,930,000	139,300
Potatoes	3,980	Bushels	990,075	246,546
Corn	3,804	do	190,200	136,944
Small fruit	606			113,735
Miscellaneous	6,587			374,993
Less duplicated areas	200			
Total cropped	45,480			3,158,857
Other purposes	10,320			
Total irrigated	55,800			

TIETON UNIT.

The Tieton lands have been largely devoted to raising alfalfa, grain hay, wheat, oats, potatoes, onions, melons, garden truck, and such other crops as could be started quickly by the new settlers. A considerable acreage has been set to fruit trees, and some of the smaller crops were raised in these young orchards.

For 1912 the production of alfalfa averaged about 2½ tons per acre, including newly seeded lands, grain hay about 1½ tons, wheat and oats slightly over half a ton, potatoes about 3½ tons, onions about 2½ tons, the total value of crops raised being about $272,000. The market price for alfalfa was low during the early part of the winter, but later the prices advanced until the market became firm toward the end of the winter at $10 to $12 per ton.

For 1913 the crops are about the same as those for 1912 with perhaps a smaller proportion of the land in potatoes. The first crop of alfalfa was cut and put into stack toward the end of June, the market being firm at prices ranging from $9 to $12 per ton. A considerable acreage has been planted to beans to determine if this crop can be grown successfully and to ascertain if special treatment of the seed will overcome the blight which has heretofore infected the crops in this vicinity. Taking into consideration the fact that

practically all the Tieton lands are new and a large per cent of the settlers inexperienced in irrigation, the crop yields have been very satisfactory and the young orchards have made excellent growth.

Considerable interest is being shown in dairying in conjunction with hog raising; this will, no doubt, become a leading industry with those who have sufficient acreage. For those who have only 5 and 10 acre tracts, it is probable that it will be necessary to devote their lands largely to fruit raising together with such small crops as they will need for home consumption.

Crop statistics, Tieton unit, Yakima project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	2,612	Ton	6,431	$46,200
Corn	765	do	979	16,900
Fruit	211	Box	57,300	23,400
Grain (wheat and oats)	862	Ton	512	12,100
Grain (hay)	1,372	do	1,958	16,600
Onions	225	do	594	7,110
Pasture	103			1,090
Potatoes	3,817	Ton	13,420	113,630
Truck garden	234			4,300
Miscellaneous (broom corn, hops, and beans)	189			30,740
Less duplicated areas	673			
Total cropped	9,717			272,070
Other purposes	5,291			
Total irrigated	15,008			

EXAMINATIONS OF APPROPRIATIONS OF WATER.

When the Reclamation Service first contemplated construction work in the Yakima Valley the waters of the Yakima River had been largely overappropriated, and the Secretary of the Interior, under date of December 12, 1905, set forth several conditions precedent to governmental activities in the valley—one being the termination of litigation before the courts and the settlement, by signed agreements, of the amounts of water claimed by various holders of water rights in the valley. This latter condition was met by the execution of instruments known as "limiting agreements," under the terms of which various individuals and corporations set forth the amount of their claims in the Yakima River and its tributaries and specifically limited those claims to the amounts indicated.

Another condition was the passage of an act by the State legislature granting to the United States the right to acquire and use for storage purposes the title to the beds and shores of any navigable lake or stream which could be utilized for construction purposes, the right to appropriate water, and the right to exercise the power of eminent domain. Such an act was passed on March 4, 1905, and under its terms the State land commissioner was authorized to withdraw from any or all appropriation under any law of the State all of the unappropriated waters of any stream or streams upon which investigations were being made by the United States. In pursuance of section 3 of the act the officers of the Reclamation Service, on behalf of the United States, under date of May 4, 1905, and April 26, 1906, served notices upon the State land commissioner to the effect that the United States contemplated an investigation to determine the feasibility of irrigation works in the Yakima Basin. The

effect of this notice was to withdraw from further appropriation all of the unappropriated waters of the Yakima River and its tributaries. This was followed by the necessary certificate of feasibility under dates of April 18 and December 17, 1906, and later, upon request of the United States, the State land commissioner extended the period of withdrawal to February 20, 1913.

On December 30, 1912, application was made by the Secretary of the Interior to E. W. Ross, State commissioner of public lands, for a further extension of time. The application was referred to the legislature, which was about to convene. After some negotiations, Clark V. Savidge, who had succeeded Mr. Ross as commissioner, with the consent of the legislative committees on irrigation, granted an extension of time to January 1, 1914, with the understanding that he would make investigation and grant such further extension as he deemed equitable.

In addition to the withdrawals specified, the United States filed appropriations covering 1,000 cubic feet of water per second at Lake Keechelus by notice recorded October 10, 1906, and 3,000 cubic feet of water per second at Lake Clealum by notice recorded October 10, 1906, both of which notices were recorded in Kittitas County.

The United States has also acquired, by contract of December 12, 1906, the rights of the Cascade Canal Co. at Lake Kachess, and by contract of May 26, 1906, the rights of the Union Gap Irrigation Co. at Lake Clealum, and in addition the United States is successor in interest to the Washington Irrigation Co. in connection with its appropriation for the Sunnyside irrigation system. On June 23, 1906, this company deeded to the Government the Sunnyside Main Canal, with its water appropriation. This appropriation is one of the earliest in the valley and originally consisted of 1,000 second-feet, the appropriation having been made on September 2, 1890, followed by an amended claim made March 23, 1891. To this amount is added 50 cubic feet, to which the United States has title as successor in interest of the Konewock Ditch Co., under an appropriation claimed to have been initiated in 1881.

HYDROGRAPHIC SURVEY.

During the summer of 1912, when litigation was apparently imminent in regard to the water rights of the valley, it was realized that the Reclamation Service did not have sufficient information in regard to all water rights to successfully meet issues that would probably be raised in such a situation. It was deemed advisable to secure as accurate detailed information as possible on each and every water right along the river, or at least on that portion of the river lying above any intakes owned or controlled by the Government. Accordingly, authority was secured for the expenditure of $10,000 for a hydrographic survey, and work was begun at the upper end of the Yakima River, locating each head gate and a short portion of each irrigation ditch with sufficient data to give capacities. In a few cases where it was deemed especially necessary, a detailed survey was made of all the land being irrigated from certain canals. In connection with these surveys affidavits were secured, as far as possible, from the owners or claimants to water rights. These affidavits set forth the claim of each water user as to the amount of water, the acreage under cultivation, the length of time used in each

season, the number of years water has been used, the source of the original claim, the kind of crops, and other information that might bear on the water-right situation and be of interest generally. It was not possible to secure affidavits from all water users, but a large per cent was secured. This information has been filed in the supervising engineer's office and will be available in case of litigation, and in fact is used from time to time in the present work of the service.

HYDROGRAPHIC INVESTIGATIONS.

On April 1, 1912, the Reclamation Service took over the hydrographic work in the Yakima Valley, most of which data had previously been secured by the Geological Survey. Since that date the Reclamation Service has gathered all data needed for its studies and investigations.

The hydrographic work for the fiscal year 1912–13 consisted of the release and distribution of stored water from the reservoirs; the consequent maintenance and operation of numerous gaging stations on private canals during the irrigation season and on the Yakima River and its most important tributaries throughout the year, as well as gathering such other data as might be of interest from the hydrographic standpoint and for the valley's ultimate development.

PUBLIC NOTICE DATED JUNE 16, 1913.

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, notice is hereby given as follows:

1. Water will be furnished from the Sunnyside unit, Yakima project, Washington, under the provisions of the reclamation act, upon the filing of proper water-right application for the following lands shown on farm-unit plats of T. 8 N., R. 22 E., T. 9 N., R. 22 E., T. 11 N., R. 20 E., and T. 9 N., R. 24 E., approved by the Secretary of the Interior February 28, 1911, T. 8 N., Rs. 23 and 24 E., approved by the Secretary of the Interior February 19, 1912, Ts. 10 and 11 N., R. 21 E., and T. 9 N., R. 25 E., approved by the Secretary of the Interior May 22, 1912, as amended May 21, 1913, viz:

Willamette meridian.

	Added irrigable area (acres).
T. 8 N., R. 22 E.:	
Sec. 2, lot 4	38
SW. ¼ NW. ¼	40
SW. ¼ SW. ¼	40
lot 3	25
SE. ¼ NW. ¼	24
SW. ¼ NE. ¼	19
SE. ¼ NE. ¼	2
NW. ¼ SW. ¼	40
T. 8 N., R. 23 E., sec. 2, lot 1	22
T. 8 N., R. 24 E.:	
Sec. 1, NE. ¼ SW. ¼	3
SE. ¼ SW. ¼	4
NW. ¼ SE. ¼	1
T. 9 N., R. 22 E.:	
Sec. 36, SE. ¼ NE. ¼	26
SW. ¼ NE. ¼	23
NE. ¼ SE. ¼	40
NW. ¼ SE. ¼	23
SE. ¼ SE. ¼	40
T. 9. N., R. 24 E.:	
Sec. 25, NE. ¼ NE. ¼	10
SE. ¼ NE. ¼	10
Sec. 30, lot 3	1
lot 4	1
Sec. 34, NW. ¼ NW. ¼	10
T 9 N., R. 25 E.:	
Sec. 32, lot 5	7.6
lot 6	1
T. 10 N., R. 21 E.:	
Sec. 9, SW. ¼ SE. ¼	9
SE. ¼ SE. ¼	1
T. 11 N., R. 20 E.:	
Sec. 36, lot 1	15
NW. ¼ NE. ¼	8
T. 11 N., R. 21 E.:	
Sec. 29, SE. ¼ SW. ¼	39

2. A supplementary list showing all lands now ready for irrigation in the Sunnyside unit has been filed in the project office at Sunnyside, Wash., showing in separate columns the area in each regular subdivision or farm unit opened to irrigation in 1909, 1910, 1911, 1912, and 1913, and the additional lands for which water will be furnished in 1914 and subsequent years will be shown on further supplementary lists to be duly filed in the said project office.

3. In all other respects applications for water rights, including the charges and the times and manner of payments, shall be governed by the terms of the public notices of March 15, 1911, and February 29, 1912, and public notices and orders supplemental thereto or amendatory thereof, except that the installment of the charges for the lands covered by this notice, and for the additional acreage for which water will be furnished in 1913, as shown by the list on file at the project office at Sunnyside, Wash., referred to in article 2 hereof, shall be due on June 15, 1913, and subsequent installments on March 1 of each year thereafter until fully paid.

LEWIS C. LAYLIN,
Assistant Secretary.

PUBLIC NOTICE DATED MARCH 21, 1913.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works have been constructed for the irrigation and reclamation of the lands under the Tieton unit, Yakima project, Wash., and the estimated cost thereof must be paid by the water users as required by said act in not exceeding 10 annual installments; and

Whereas public notices of the charges payable and the time and manner of payment have been given for the said Tieton unit, the said charges being fixed so as to cover the estimated cost of building, operating, and maintaining the project as to the lands in question; and

Whereas certain water users have not made the payments as required by the said public notices, for reasons which in many cases have been unavoidable on their part, and it has accordingly been decided to offer opportunity under the terms of the act of February 13, 1911 (36 Stat., 902), for the water users to secure easier terms of payment, and at the same time recover for the reclamation fund as required by the terms of the reclamation act, the said estimated cost of the building, operation, and maintenance of the irrigation works on said unit:

Now therefore the following public notice is issued under the terms of section 4 of the reclamation act and acts amendatory thereof or supplementary thereto and especially of the said act of February 13, 1911:

1. Owners of and entrymen upon lands for which acceptable water-right applications have heretofore been filed in accordance with the terms of any public notice now in effect for the said Tieton unit may continue to make payments under the terms thereof.

2. Such owners and entrymen may, after qualifying under the provisions of this notice, make the payments of the portions of in-

stallments for building charge under such applications in accordance with the following graduated schedule, to wit:

First installment	$9.30
Second installment	1.50
Third installment	3.00
Fourth installment	4.00
Fifth installment	5.20
Sixth installment	10.00
Seventh installment	15.00
Eighth installment	15.00
Ninth installment	15.00
Tenth installment	15.00

Provided, however, That no person shall be entitled to make payments in accordance with said schedule until he shall have first reclaimed and cultivated 50 per cent of the total irrigable area covered by his said application.

3. In order to receive the benefit of the graduated payments as outlined, an owner or entryman shall file with the supervising engineer of the United States Reclamation Service in North Yakima a certificate in the following form, to-wit:

I, _____ hereby certify that I am the owner (or homestead entryman) of the _____ of Section_____, Township_____ North, Range _____ East, W. M., and that said land is covered by water-right application No. _____, dated _____ _____, covering _____ irrigable acres, and that I have reclaimed and cultivated _____ acres of said land; that I desire to receive the benefits afforded by public notice dated March 21, 1913, and that if the benefits of the schedule of graduated payments therein are afforded me, I hereby agree to accept the provisions of said public notice and to make all payments promptly in accordance therewith.

Signed _____

Dated _____

Approved on the part of the United States by

_____

Supervising Engineer.

4. All entries of lands not heretofore entered and of lands which have heretofore been entered and relinquished to the United States and which are not accompanied by written assignment of credit for payments theretofore made, shall be subject to the provisions of the public notices and orders heretofore issued, and shall be accompanied by the amount of the first installment of the charges under the provisions thereof. If at the time the second installment becomes due such entryman shall have reclaimed and cultivated not less than 25 per cent of the irrigable area of his entry and certificate to that effect on the form set forth herein is approved, his second installment on account of the building charge shall be reduced to $1.50 per acre and the balance added to the tenth annual installment; and if, when the third payment becomes due, 50 per cent of the irrigable area covered by such entry shall have been reclaimed and cultivated as herein provided for, and appropriate certificate executed therefor, and ap-

proved, the third and subsequent installments shall be graduated in accordance with the schedule of graduated payments herein provided for.

5. Water users who qualify under the provisions of this notice may have any payments heretofore made by them on account of the building charge portion of the second or later installments credited to the payments of the building charge portion of the second and subsequent installments of the schedule in paragraph 2 hereof.

6. Until further notice the portions of installments for operation and maintenance shall be as announced in public notices heretofore issued for the said unit, and shall be due and payable as specified therein, and all the terms of the public notices heretofore issued or water-right applications made and accepted thereunder shall be and remain in full force and effect except as herein specifically modified.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

PUBLIC NOTICE DATED APRIL 25, 1913.

The public notice for the Tieton unit, Yakima project, Washington, dated March 21, 1913, under the provisions of the Reclamation Act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, establishing a system of graduated payments under specific conditions, is hereby amended by adding thereto the following paragraph:

7. Owners of, and entrymen upon lands for which acceptable water-right applications shall be hereafter filed in accordance with the terms of any public notice now or hereafter in effect for said Tieton unit, may be admitted to the benefits of this public notice, and make payments according to the schedule herein, by complying with all of the terms hereof as to reclamation and cultivation.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

PUBLIC NOTICE DATED JUNE 16, 1913.

1. In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of the acts amendatory thereof and supplementary thereto, notice is hereby given that water will be furnished from the Tieton unit for the irrigable land in the northwest quarter of northeast quarter, northeast quarter of northwest quarter, southeast quarter of northwest quarter, southwest quarter of northeast quarter, being, respectively, farm units E, F, G, and H of sec. 30, T. 13 N., R. 17 E., W. M., as shown on amended plat approved May 28, 1913, and on file in the local land office and the project office, both in North Yakima, Wash.

2. The charges, times, and the manner of making payments shall be governed by the terms of the public notice of April 18, 1912, as amended by public notice of May 10, 1912, except that for lands covered by this public notice the first installment of charges for building, operation, and maintenance shall be due and payable at the time of filing applications, as hereinafter provided; the second installment shall be due on April 1, 1914, and subsequent installments

shall become due on April 1 of each year thereafter. All installments of charges shall become due and payable as herein provided, whether or not water-right application is made therefor or water is used thereon.

3. All water-right charges are payable to the special fiscal agent, United States Reclamation Service, North Yakima, Wash.

4. The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family is as shown on the plat.

5. Homestead entries, accompanied by applications for water rights and the first installment of the charges for building, operation, and maintenance may be made under the provisions of said act for the farm units covered by this notice, in the manner hereinafter provided.

6. Homestead applications for the said farm units shall be made only in the manner following: Any person qualified to make homestead entry may execute such application on and after June 25, 1913, up to and including June 30, 1913, before any duly authorized officer within the land district. Each homestead application must be accompanied by a properly executed water-right application and by a certified check on a national bank or post-office money order, drawn to the order of the special fiscal agent, United States Reclamation Service, for the amount of the first installment of the water-right charges for building, operation, and maintenance, viz, $10.80 per acre of irrigable land, and also by a certified check on a national bank or post-office money order, drawn to the order of the receiver, United States land office, for the amount of the fees and commissions, amounting to $6.50 per entry.

7. The homestead application, the water-right application, and the certified checks or money orders, and all papers necessary to show the applicant to be qualified to make homestead entry, shall be inclosed in a sealed envelope, addressed to the register and receiver of the United States land office at North Yakima, Wash., and the upper left-hand corner of the envelope must contain the name and address of the applicant and the description of the land, by farm unit, section, township, and range, and be marked "Tieton unit." The papers so prepared and inclosed in a sealed envelope may be filed in person, through another, or through the mail, in the United States land office at North Yakima, Wash., on June 30, 1913, between the hours of 9 a. m. and 4.30 p. m. All persons sending in their applications by mail should post them at such time as to insure their being received at the local land office between these hours. All applications filed before 9 o'clock a. m. of that day will be returned without opening, and all applications filed after 4.30 o'clock p. m. of that day will be held until all applications filed between 9 a. m. and 4.30 p. m. have been disposed of, when, if there are any vacant farm units for which delayed applications are filed, they will then be considered in the order of their filing.

8. Warning is hereby expressly given that no rights can be obtained by settlement made on the land since the date of its withdrawal under the provisions of the reclamation act of June 17, 1902 (32 Stat. L., 388), and prior to the allowance of entry hereunder, nor will any person be allowed to obtain preference right or other advantage

through priority in presenting homestead application at the United States land office, or by holding a place in any line formed at that office, nor in any other manner than as herein provided for.

9. Where two or more persons apply for the same farm unit on the date above specified, the right to enter will be determined in the manner hereinafter prescribed, on July 2, 1913, at the United States land office at North Yakima, Wash.

10. No person will be allowed to present application to enter more than one farm unit, which must be specifically and fully described in the homestead application and water-right application, according to legal subdivision, section, township, and range, and also by farm-unit description. If any person presents applications for more than one farm unit, none of his several applications will be considered.

11. It shall be the duty of the register and receiver and the project manager of the said Tieton unit to arrange all envelopes containing applications presented hereunder in alphabetical order, according to the names of the several applicants shown on the outside thereof, without opening the same. They shall also prepare cards or slips of paper of uniform size, color, and appearance, and the names of the several applicants shall be written, one on each slip of paper, with a description of the farm unit applied for, and such cards representing applications for one particular farm unit shall be assembled.

12. The right of entry for each farm unit shall be determined in public, and before the right for each farm unit for which more than one person has applied is determined, it shall be the duty of the register of the local land office to make public announcement that such right is about to be determined. All cards or slips of paper representing applications to enter such farm unit will then be placed in a box or other receptacle provided for that purpose and the register of the land office shall publicly announces the name of each applicant at the time the card or slip of paper bearing his name is placed within the receptacle. All cards or slips of paper in the receptacle shall be thoroughly mixed, and one card or slip of paper will then be drawn therefrom by some impartial and disinterested person designated by the officers in charge, and the right to enter the farm unit will be accorded to the applicant whose name appears on the card or slip so drawn, provided he is duly qualified to make homestead entry and water-right application, and the envelope containing his application will be immediately opened and the papers examined by the local land office, and, if found to comply with the law and the regulations thereunder, they will be given a serial number; and upon approval of the water-right application by the project manager the homestead application will be allowed by the local land officers, but no receipt will be issued until the certified checks, where such accompanied the application, have been paid. While applicants may be present at the time right of entry is awarded, yet such presence is not necessary, as the applications of successful persons will be immediately allowed on the papers already filed and notice at once mailed the successful applicants.

13. The slips of paper bearing the names of the other applicants for the particular farm unit will be retained in the receptacle; and if, on examination, it shall be found that the applicant whose name is first drawn is not qualified to make a homestead entry or water-right

application, or the papers filed in support thereof are unsatisfactory, the register will thereupon reject his application, assigning reasons therefor, and allow the applicant the usual right of appeal, whereupon a second slip will be drawn from such receptacle in the same manner as the first slip was drawn, and the person whose name appears on said second slip shall be accorded the right to make entry of the unit, if duly qualified and his showing is satisfactory. Such procedure shall be followed until a person is found who is qualified to make homestead entry and water-right application and who has met all requirements. Where a second drawing is necessary and entry is allowed thereon, such entry will be subject to the rights of the party whose application was first drawn, if upon appeal the action of the local land officers in rejecting his application be set aside.

14. When the right to enter all of the farm units applied for has been determined, the envelopes remaining unopened shall each be at once inclosed in an official Government envelope and returned by the local land officers to the persons whose names appear on the outside thereof.

15. In order that every person desiring to execute and present application for any of the farm units may be enabled to do so at the time allowed, without causing a rush, warning is hereby given that all such applications should be prepared and executed before some of the officers authorized by law at as early a date as possible after June 25, 1913.

16. After the expiration of the period for entry hereinbefore provided for, all entries made for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by all charges for building, operation, and maintenance then due. Where payments have been duly made by the prior applicants and credits therefor duly assigned in writing, the entryman shall continue the payment thus begun. In other cases the entryman shall pay the first installment in full at the time of his entry; the second installment shall become due on April 1 of the calendar year following the date of entry; and subsequent installments shall become due on April 1 of each year thereafter until fully paid.

17. Entrymen of lands for which acceptable water-right applications shall be filed in accordance with the terms of this notice may secure the benefits of the public notices of March 21 and April 25, 1913, and make their payments according to the schedule therein by complying with the terms thereof as to reclamation and cultivation.

18. The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges which have become due shall have been paid in full.

19. Failure to pay any two installments of the charges when due shall render the entry and the corresponding water-right application subject to cancellation, with forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

LEWIS C. LAYLIN,
Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, Yakima storage project, June 30, 1918.

ASSETS.

Cash in other employee's hands awaiting transfer to special fiscal agents			$684.20
Accounts receivable uncollected, miscellaneous			9,696.98
Inventories:			
Mercantile stores		$5,435.01	
Equipment in use—			
Animals	$22,622.50		
Mechanical, etc	89,848.36		
		112,470.86	
Storehouse		33,363.20	
Cement		5,860.01	
Structural steel		271.38	
Lumber		1,545.86	
Explosives		3,220.46	
Forage		1,886.76	
Fuel		732.35	
Unadjusted transfers between projects		591.51	
Less credit, freight, and handling		[1] 689.10	
			164,688.30
Improvements to land:			
Gross cost		882,833.02	
Less credits from incidental operations—			
Rental of cottages	1,424.12		
Rental of grazing land	51.00		
Rental of irrigation water	14,305.00		
Revenue, miscellaneous	22,736.98		
Mess profit	14,425.34		
Mercantile store profit	2,991.32		
Hospital profit	562.28		
		56,496.04	
			826,336.98
Total assets			1,001,406.46

LIABILITIES.

Accounts payable:			
Labor		18,100.30	
Purchases		46,035.96	
Freight and express		6,883.16	
Passenger fares		492.30	
Coupons		280.05	
			71,791.77
Reserves, depreciation on plant equipment			2,804.36
Unadjusted credits, net earnings of Government animals			7,297.50
Net investment:			
Disbursement vouchers	831,278.81		
Transfers received	111,858.02		
		943,136.83	
Less—			
Collection vouchers	14,378.58		
Transfers issued	9,245.42		
		23,624.00	
			919,512.83
Total liabilities			1,001,406.46

[1] Deduct.

Assets and liabilities, Yakima-Sunnyside project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to special fiscal agent			$38.19
Accounts receivable:			
Freight refunds		$18.75	
Miscellaneous		9,852.18	
Water-right building charges		177,139.86	
Water-right operation and maintenance charges		44,302.93	
			231,313.72
Inventories:			
Equipment in use—			
Animals	$300.00		
Mechanical and other	11,687.65		
		11,987.65	
Materials, etc., in storehouse		6,745.75	
Cement		1,061.64	
Lumber		544.17	
Forage		167.43	
Unadjusted transfers between projects		[1]128.85	
Undistributed cost (freight and handling)		[1]927.33	
			19,450.46
Improvements to land:			
Gross cost		2,382,827.84	
Less credits from incidental operations—			
Revenues, miscellaneous	402.15		
Profits, messes	4,639,26		
Profits, mercantile stores	2,725.61		
Profits, hospital	619.52		
Contractors' freight refunds	8,905.62		
Forfeitures, bidders' and contractors'	18,671.30		
		35,963.46	
			2,346,864.38
Deferred operation and maintenance revenues			3,297.28
Total assets			2,600,964.03

LIABILITIES.

Accounts payable:			
Labor		3,581.80	
Purchases		579.12	
Freight and express		540.25	
Passenger fares		224.05	
Land agreements		270.00	
Miscellaneous		615.95	
			5,811.17
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	683,500.71		
Advance collections	6,658.50		
		690,159.21	
For depreciation on plant and equipment		371.34	
			690,530.55
Unadjusted credits, net earnings Government animals			19,863.10

[1] Deduct.

Net investment:			
Disbursement vouchers	$2,780,189.50		
Transfers received	111,224.16		
		$2,891,413.66	
Less—			
Collection vouchers	943,186 80		
Transfers issued	63,467.65		
		1,006,654.45	
			$1,884,759.21
Total liabilities			2,600,964.03

Assets and liabilities Bumping Lake Reservoir, Yakima-Tieton project, June 30, 1913.

ASSETS.

Cash on hand			$21.45
Accounts receivable:			
Freight refunds		$8.33	
Water-right building charges		117,625.80	
Water-right operating and maintenance charges		31,301.14	
			148,935.27
Inventories:			
Merchandise store		209.90	
Equipment in use—			
Government animals	$3,160.00		
Mechanical and other	12,629.84		
		15,789.84	
Storehouse		858.53	
Cement		50.00	
Structural steel		192.80	
Lumber		922.60	
Explosives		15.64	
Forage		515.94	
Product local operations		440.51	
Unadministered transfers		5,888.61	
Freight and handling		[1] 2,438.77	
			22,445.60
Improvements to land:			
Gross cost		3,028,369.72	
Less credits from incidental operations—			
Rentals cottages	4,234.97		
Rentals irrigation water	3,526.50		
Loss, messes	[1] 139.81		
Profit, stores	9,131.59		
Profit, hospital	1,351.28		
Adjustments freight refunds	5,100.45		
		23,204.98	
			3,005,164.74
Total assets			3,176,567.06

LIABILITIES.

Accounts payable:		
Labor	3,239.83	
Purchases	2,275.14	
Freight	525.70	
Passenger fares	252.34	
Coupons	8.70	
		6,301.71

[1] Deduct.

Reserves:			
Amortization of original cost by repayment—			
Building charges accrued	$283,329.98		
Advance collections	3,091.80		
		$286,421.78	
Depreciation		145.20	
			$286,566.98
Unadjusted credits, net earnings of Government animals			15,327.82
Net investment:			
Disbursement vouchers	2,874,719.83		
Transfers received	557,163.32		
		3,431,883.15	
Less—			
Collection vouchers	300,754.90		
Transfers issued	271,206.65		
		571,971.55	
			2,859,921.60
Excess operation and maintenance			8,448.95
Total liabilities			3,176,567.06

Feature costs Yakima project to June 30, 1913.

STORAGE UNIT.

Lakes Clealum, Keechelus, Kachess, and McAllisters Meadows:		
General expense	$68,927.97	
Real estate	23,071.19	
Crib dams, construction and maintenance	113,803.32	
Kachess and Keechelus Dams, construction	531,623.64	
Kachess Dam, maintenance	641.52	
		$738,067.64
Wagon roads and highways, construction and maintenance		16,330.67
Telephone system, construction and maintenance		3,378.80
Buildings:		
Camp construction and maintenance	73,013.26	
Watchman's house, Kachess	2,146.45	
Watchman's house, Keechelus	2,012.25	
		77,171.96
Examination of unit:		
Reservoir reconnoissance	1,924.88	
Hydrographic survey and investigation	14,801.02	
		16,725.90
Inventory of cost ledger supplies		31,158.05
Total building cost of unit		882,833.02

SUNNYSIDE UNIT.

Preliminary expense		45,918.42
Purchase of canal:		
Purchase price	245,072.00	
Miscellaneous expense	3,618.64	
		248,690.64
Main Canal and headworks:		
Diversion Dam and headworks	55,680.75	
Enlargement Bucyrus dredge	339,636.87	
Enlargement drag bucket excavator	126,211.20	
Enlargement team work	189,924.42	
Enlargement extension	13,251.09	
Drops	74,998.29	
Culverts	33,819.30	
Turnouts	36,352.38	
Bridges	4,786.56	
Miscellaneous structures	32,657.24	

Main Canal and headworks—Continued.		
Rocky Ford headworks	$2,606.96	
Outlet weir (mile 59.70)	1,889.55	
Right of way	46,628.79	
		$958,443.40
Zillah wasteway		36,116.93
Snipes Mountain division:		
Headworks	9,327.11	
Enlargement and drops	39,081.61	
		48,408.72
Sulphur Creek wasteway:		
Headworks	11,483.12	
Lined section	46,226.06	
Earth section	272,503.78	
Outlet drop	3,641.04	
		333,854.00
Mabton division:		
Headworks	6,468.00	
Feeder canal	23,278.23	
Pipe line	145,122.45	
River crossing	26,774.32	
Intake and outlet structures	4,890.15	
Laterals (excavation and flumes)	20,460.11	
Wasteway	1,794.28	
		228,787.54
Prosser division:		
Intake and outlets	2,476.34	
Pipe line	72,104.66	
Main lateral system	19,324.34	
		93,905.34
Distribution system:		
Farm-unit survey	20,655.63	
Topographic survey	39,884.92	
Construction	264,685.97	
		325,226.52
Pumping plants, investigation		2,080.37
Drainage investigation		11,418.80
Telephone system		13,848.61
Buildings:		
Headquarters building and grounds	24,276.46	
Patrol houses and grounds	11,852.09	
		36,128.55
Total building cost		2,382,827.84
Operation and maintenance:		
Operation	154,805.75	
Maintenance, diversion dam and headworks	2,808.40	
Maintenance, main and branch canals	155,479.28	
Maintenance, laterals	108,600.08	
Maintenance, spillways	6,687.30	
General expense (undistributed)	14,312.30	
Total operation and maintenance cost		442,693.11
Total cost of unit		2,825,520.95

TIETON UNIT.

Diversion system:		
Dam	11,711.99	
Headworks	3,300.14	
		15,012.13
Tieton Main Canal:		
Earth work, open canal	263,969.84	
Driving tunnels, etc	295,851.55	
Manufacturing and placing shapes	463,518.26	
Auxiliary structures	92,491.56	
		1,115,831.21

Distribution system:		
General expense	$61,265.10	
North Fork channel and diversion dams	24,638.50	
Main laterals and structures	694,443.58	
Sublaterals and structures	450,193.57	
		$1,230,540.75
Wagon roads:		
Tieton Main Canal	52,674.69	
Distribution system	5,827.62	
		58,502.31
Telephone system:		
Main Canal	6,236.62	
Distribution system	18,958.39	
		25,195.01
Real estate, Main Canal		2,768.60
Buildings:		
Headquarters buildings and grounds	24,167.68	
Patrol houses	17,731.00	
		41,898.68
Examination and surveys, Main Canal		18,638.00
Total building cost, Tieton unit		2,508,386.69
Operation and maintenance:		
Operation—		
Main Canal	4,519.10	
Distribution system	25,943.15	
Maintenance—		
Main Canal	5,768.23	
Distribution system	31,801.66	
Bumping Lake Dam and Reservoir	4,233.31	
Headquarters farm	829.10	
General expense (undistributed)	10,662.28	
Total operation and maintenance cost		83,756.83
Total Tieton building and operation and maintenance cost		2,592,143.52
Bumping Lake and McAllisters Meadows:		
Bumping Lake, construction	519,453.38	
McAllisters Meadows, investigation, inventory of cost ledger supplies[1]	529.65	
		519,983.03
		3,112,126.55

RECAPITULATION BY UNITS.

Building cost:		
Storage	882,833.02	
Sunnyside	2,382,827.84	
Tieton, including Bumping Lake	3,028,369.72	
		6,294,030.58
Operation and maintenance:		
Sunnyside	442,693.11	
Tieton	83,756.83	
		526,449.94
Total building and operation and maintenance cost		6,820,480.52

Operating revenues and expenses, Yakima-Sunnyside project, to June 30, 1913.

EXPENSES.

Development, maintenance		$2,808.40
Carriage:		
Operation	$144,035.07	
Maintenance	162,166.58	
		306,201.65

[1] Included in storage unit.

Distribution:		
Operation	$10,770.68	
Maintenance	108,600.08	
		$119,370.76
Undistributed expenses		14,312.30
Total		442,693.11

REVENUES.

Operation and maintenance accruals	395,995.39
Operation and maintenance, advance payments	473.58
Rental of lands and buildings	517.50
Rental of power and light	1,989.20
Rental of irrigation water	34,940.05
Miscellaneous revenues (interest)	5,480.11
Deferred operation and maintenance revenues	3,297.28
Total	442,693.11

Operating revenues and expenses, Yakima-Tieton project, to June 30, 1913.

EXPENSES.

Development:		
Operation	$2,137.71	
Maintenance	2,095.60	
		$4,233.31
Carriage:		
Operation	4,519.10	
Maintenance	5,768.23	
		10,287.33
Distribution:		
Operation	25,943.15	
Maintenance	31,801.66	
		57,744.81
Undistributed expenses		11,491.38
Excess of revenues over costs		8,448.95
Total		92,205.78

REVENUES.

Operation and maintenance, accruals	90,857.58
Operation, advance payment	45.00
Rental of buildings	1,205.70
Rental, irrigation water	97.50
Total	92,205.78

Estimated cost of contemplated work, Yakima project.

Storage unit:		
Keechelus Dam	$362,450.00	
Kachess Dam and Reservoir	52,900.00	
Clealum crib, dam, and timber	3,550.00	
McAllisters Meadows Reservoir	14,675.20	
Hydrographic investigations	9,920.00	
Hydrographic survey	1,650.62	
		$445,145.82
Sunnyside unit:		
Main canal and headworks	14,042.71	
Zillah wasteway	283.07	
Snipes Mountain division	3,225.00	
Mabton division	200.00	
Distribution system	40,796.48	
		58,547.26

Tieton unit:		
Clearing Bumping Lake Reservoir	$34,840.00	
Tieton River storage, Clear Creek Dam	36,960.00	
		$71,800.00
Total		575,493.08

WYOMING, SHOSHONE PROJECT.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see Appendix, pp. 322 and 337.)

LOCATION.

Counties: Park and Bighorn.
Townships: 52 to 58 N., Rs. 97 to 104 W., sixth principal meridian.
Railroad: Chicago, Burlington & Quincy.
Railroad stations and estimated population January 1, 1913: Cody 1,300, Corbett,[1] Deaver,[1] Ralston 25, Powell 400, Garland 125, Mantua,[1] and Frannie,[1] Wyo.

WATER SUPPLY.

Source of water supply: Shoshone River.
Area of drainage basin: 1,380 square miles.
Annual run-off in acre-feet of Shoshone River near Cody (1,380 square miles), 1902 to 1912—maximum, 1,420,000; minimum, 905,000; mean, 1,125,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1913: 41,310 acres.
Area under water-right applications, season of 1913: 23,635 acres.
Length of irrigating season: From April 20 to October 20—180 days.
Average elevation of irrigable area: 4,500 feet above sea level.
Average annual rainfall on irrigable area: 1907 to 1912, 5.81 inches (1912, 7.05 inches).
Range of temperature on irrigable area: —31° to 101° F.
Character of soil of irrigable area: Light sandy and clay loams.
Principal products: Alfalfa, grain, vegetables, cattle, and hogs.
Principal markets: Omaha, Nebr.; Kansas City, Mo.; Chicago, Ill.; Billings, Mont.; and local.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: November 25, 1907; April 3, 1908; May 8, 1909; February 6, 1911; March 25, 1911; May 20, 1911; November 8, 1911; February 9, 1912; March 23, 1912; July 17, 1912; January 17, 1913; February 26, 1913; and June 23, 1913.
Location of lands opened: Ts. 54 to 56 N., Rs. 98 to 100 W., sixth principal meridian.
Present status of irrigable lands opened: 23,105 acres of public and 530 acres of private land under water-right application, 15,248 acres of unentered public land, and 2,002 acres of private and State land open to entry for which water is available, but for which no water-right application has been made; 324 acres of land included in United States reserves.
Limit of area of farm units: Public, 80 acres; private, 160.
Duty of water: 2 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $50 on first unit, $51 on second, and $52 on third and fourth.
Annual operation and maintenance charge: $1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.
Construction recommended by Board of Engineers February 1, 1904.
Construction authorized by Secretary February 10, 1904.

[1] Railroad sidings only.

Corbett diversion dam completed June, 1907.
Corbett Tunnel completed November, 1907.
First irrigation by Reclamation Service, season of 1908.
Garland Canal completed in 1908.
Shoshone Dam completed January, 1910.
Entire project 50 per cent completed June 30, 1913; first, second, third, and fourth units completed.

IRRIGATION PLAN.

The irrigation plan of the Shoshone project provides for the storage of flood waters of Shoshone River in a reservoir controlled by Shoshone Dam, about 8 miles above Cody, Wyo.; the diversion of water from Shoshone River by a dam at Corbett, about 16 miles below the reservoir, and through the Corbett Tunnel into a canal system supplying water to lands on the north side of the river in the vicinity of Ralston, Powell, Garland, Mantua, and Frannie; the diversion into the Willwood Canal for the irrigation of lands on the south side of the Shoshone River; and the diversion into the north side High Line from the Shoshone Dam for the irrigation of lands lying on the north side of the Shoshone River above the Garland Canal system and extending from the lower end of the Shoshone Canyon near Cody to the divide between the Shoshone River and Clarks Fork drainage.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The Shoshone Dam, Corbett Dam, Corbett Tunnel, Garland Canal, about 12 miles of the Frannie Canal, and the lateral and distributary system for approximately 42,000 acres in the vicinity of Ralston, Powell, and Garland, Wyo., have been completed.

Future operations include the construction of the High Line Canal, the Willwood Canal, and the extension of the Frannie Canal to cover lands in the vicinity of Frannie, Wyo.

CONSTRUCTION DURING FISCAL YEAR.

Shoshone Dam.—The work of installing two 30-inch gate valves on each of the two 42-inch outlet pipes through the base of the Shoshone Dam was begun and completed during the spring of 1913. It involved the excavation of approximately 100 cubic yards of loose rock in the river bed to unwater the lower ends of the pipe, the placing of 4 gate valves, each weighing 5,700 pounds, with necessary reducers, nipples, and expanders; and the placing of 32 cubic yards of concrete in the gatehouse.

Drainage work.—Work was continued on suspended contract No. 411 to November 8, 1912, when excavation was stopped due to the inability of the contractor's steam shovel to make progress in the material encountered. At the beginning of the fiscal year 37.8 per cent of the work was completed, and when operations were suspended in November 65.47 per cent had been completed.

Tile drains: During the fiscal year authority was granted for the construction of 140,000 linear feet of tile drains in the vicinity of Powell and Garland. Excavation was begun on this work with drag-line excavator on August 7, 1912, with trench excavator on October 4, 1912, and with an additional drag-line excavator on June 23, 1913. Excavation and tile laying were suspended during the winter months from the middle of December, 1912, to the middle of April, 1913, on account of frozen ground. At the close of the fiscal year 85,335 linear feet of tile had been laid in tile drains.

OPERATION AND MAINTENANCE.

During the season of 1913 the Shoshone Dam, Corbett Diversion Dam, the main supply (Garland) canal, 10 main laterals, and 80

distributaries, aggregating 245 miles of canal, were operated. The principal difficulty experienced in maintaining the canals occurs in the spring when considerable trouble results from the erosion of banks and washing out of small structures due largely to frost loosening the soil. Trouble was experienced in the spring with Russian thistles clogging canals.

For "Summary of operation and maintenance results," see Appendix, p. 334.

The following statement shows the extent of the area affected by seepage in 1910, 1911, 1912, and 1913:

Area affected by seepage.

	1910	1911	1912	To June 30, 1913.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Area so affected as to be too wet to cultivate	255	874	2,014	1,359
Area so affected as to materially reduce crop yields	87	655	1,316	614
Number of farm units affected	29	111	164	132

The figures in the above table for 1913 include lands over which the water table has been lowered and which are drying out, but which have not yet been brought to a producing status. The drainage work now being done, and the contemplated construction of approximately 10 miles of additional tile drain are designed to lower the ground-water plane in the areas now affected or threatened by seepage.

The following table contains data with reference to the status of irrigable lands, use of water, etc., from 1909 to 1913, inclusive:

Historical review, Shoshone project.

Item.	1909	1910	1911	1912	1913 to June 30.
Acreage for which service was prepared to supply water	30,898	30,898	34,898	41,332	41,310
Acreage irrigated	9,025	14,701	16,216	16,524	13,500
Number of farms irrigated	167	275	322	346	380
Miles of canal operated	90	110	210	245	245
Water stored (acre-feet) maximum		157,000	300,000	425,600	456,000
Water diverted (acre-feet)	36,257	48,241	54,862	50,100	29,756
Water delivered to land per acre of land irrigated (acre-feet)	2.54	2.05	2.20	1.66	1.18

SETTLEMENT.

During the fiscal year there was a slight increase in settlement over the preceding year. Fifty-two farm units were taken by homestead entry with an aggregate irrigable area of 3,457.10 acres. During the year 16 entrymen relinquished and 10 entries were canceled for nonpayment of water-right charges, leaving a net gain in settlement of 1,477.21 acres, bringing the total of public lands taken to June 30, 1913, up to 23,105.27 acres. No additional water rights were taken for private lands. Relinquishments have been made since the project was opened as follows: 1908, 2; 1909, 19; 1910, 34; 1911, 37; 1912, 34; 1913 (to June 30), 9. No farms have changed hands by relinquishment since March, 1913, from which it would appear that settlers now on the farms have confidence in the future development of the coun-

try and ultimate success in the reclamation of the lands under the project.

The following statement shows the estimated population on farms and in towns on the project for the past three years (exclusive of Cody):

	1911	1912	1913
On farms	1,400	1,700	1,800
In towns	325	500	600

On December 2, 1912, a public auction of town lots was held at Powell, at which time 12 resident lots and 4 acre tracts were sold. During the fiscal year 1913 there were 23 town lots sold in Powell town site, returning to the fund $6,520, and bringing the total returns to the fund on account of town-lot sales to $30,590 on June 30, 1913. By act of Congress, approved August 21, 1912, block 31 of Powell town site was deeded to school district No. 2. The district is erecting upon the site a school building which will cost, upon completion, approximately $20,000.

PRINCIPAL CROPS.

The total gross value of crops for the season of 1912 was $155,400, of which 54 per cent, or $84,000, was produced on 7,790 acres of old alfalfa. The average yield of alfalfa was 1.66 tons per acre, and the maximum 4 tons per acre. The climate is well adapted to the growing of oats, the maximum yield being 81.5 bushels per acre. This was grown on alfalfa land and gives a fair estimate of the results which may be expected when alfalfa is plowed under. Potatoes show the largest gross returns per acre. After the farmers have had more experience in growing potatoes by irrigation their production will probably be one of the leading industries.

The following table gives crop statistics in full for the season of 1912:

Crop statistics, Shoshone project, calendar year 1912.

Crop.	Acreage irrigated or cropped.	Unit of yield.	Total yield.	Total value.
Alfalfa	7,790.25	Ton	12,921.00	$83,987.00
Alfalfa seed	38.00	Bushel	32.83	355.00
Do	118.50	Not threshed		
Barley	224.00	Bushel	3,588.00	1,973.00
Brome grass seed	6.00	do	50.00	53.00
Emmer	76.00	do	2,138.00	1,283.00
Flax	4.00	do	60.00	120.00
Oats	3,205.25	do	66,460.00	26,584.00
Oat, hay	289.25	Ton	256.00	1,792.00
Pasture, alfalfa	113.50	do	226.65	1,473.00
Potatoes	103.50	Bushel	7,947.00	3,576.00
Speltz	27.00	do	486.00	292.00
Timothy seed	4.00	do	6.00	32.00
Do	5.00	No yield		
Truck	324.00			7,379.00
Wheat, hay	116.50	Ton	121.16	364.00
Wheat, spring	2,781.25	Bushel	40,562.00	24,337.00
Wheat, winter	211.50	do	2,727.00	1,800.00
Total cropped	15,437.50			155,400
Other purposes	1,814.33			
Cropped and not irrigated	727.50			
Total irrigated	16,524.33			

ORDER DATED JULY 17, 1912.

The order of February 6, 1911, for the Shoshone project, Wyoming, regarding the amount of water to be delivered, is hereby modified by the addition of a proviso to paragraph 4 so that the order shall read as follows:

1. The instructions accompanying the public notices heretofore issued opening to irrigation lands in the Shoshone project, Wyoming, in pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), provide that the amount of water to be furnished to be stated in the second paragraph of each water-right application is 3 acre-feet per acre per annum.

2. In accordance with such instructions the water-right application as executed by the water users reads as follows:

> The amount of water to be furnished hereunder shall be 3 acre-feet of water per annum per acre of irrigable land as aforesaid, measured at the land, or so much thereof as shall constitute the proportionate share per acre from the water supply actually available for the lands under said project: *Provided*, That the supply furnished shall be limited to the amount of water beneficially used on said irrigable land.

3. Experience has demonstrated that the quantity of water stated is in excess of the actual needs for beneficial use, and that the application of the said quantity of water is having a detrimental effect upon the irrigated lands.

4. It is accordingly hereby ordered that the amount of water to be furnished hereafter shall not exceed 2 acre-feet of water per annum per acre of irrigable land, measured at the land, or so much thereof as shall constitute the proportionate share per acre from the water supply actually available for the lands under said project: *Provided*, That the supply furnished shall be limited to the amount of water beneficially used on said irrigable land: *Provided further*, That additional water may be furnished in quantities not less than a quarter acre-foot per acre for the land for which the water is to be delivered at the rate of 80 cents per acre-foot, upon payment for such amount at the time of ordering the same.

SAMUEL ADAMS,
First Assistant Secretary.

ORDER DATED JANUARY 17, 1913.

Whereas, by the fourth paragraph of section 2 of the public notice dated May 8, 1909, for the second unit of the Shoshone project, Wyoming, provision is made for the accumulation of the portions of the installments of charges account of operation and maintenance under the following terms and conditions:

> Entries and water-right applications filed in 1910 and subsequent years must, in addition to one full installment of the charges, be accompanied by an amount equal to the portions of the installments of prior years for operation and maintenance, which would have been payable had the entry and application been made in 1909.

Whereas similar provision for the accumulation of the portions of the installments of charges account of operation and maintenance is contained in section 7 of the public notice issued May 20, 1911, for lands within the third unit of said project; and

Whereas the public notice issued February 9, 1912, for the relief of parties who had filed entries or water-right applications under the previous public notices provides that upon the filing by such parties of water-right applications subject to the provisions of the said public notice of February 9, 1912, as amendatory to water-right applications theretofore filed, the portions of installments for operation and maintenance shall not accumulate; and

Whereas such water-right applications as have been continued under the public notices of May 8, 1909, and May 20, 1911, pursuant to section 1 of the public notice of February 9, 1912, are subject to the accumulation of the portions of the installments of charges account of operation and maintenance; and

Whereas it is desired to place all water-right applicants for lands on the project on an equitable basis:

Now, therefore, by virtue of the authority given me by the act of Congress approved June 17, 1902 (32 Stat., 388), commonly called the reclamation act, and by acts supplementary thereto and amendatory thereof, it is hereby ordered:

That the fourth paragraph of section 2 of the public notice of May 8, 1909, and section 7 of the public notice of May 20, 1911, are hereby revoked, and all water-right applicants who have elected to continue their applications under the public notices of May 8, 1909, or May 20, 1911, pursuant to section 1 of the public notice of February 9, 1912, as well as all applicants who have made water-right applications under the terms of the public notice of February 9, 1912, as amendatory to water-right applications theretofore filed, who have made payment of accumulated portions of installments of charges account of operations and maintenance shall be allowed due credit for any such payments made upon the portions of subsequent installments of the charges account of operation and maintenance.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets and liabilities, Shoshone project, June 30, 1913.

ASSETS.

Cash in other employees' hands awaiting transfer to special fiscal agents		$66.60
Accounts receivable:		
Freight refunds	$7,009.83	
Water-right building charges	57,406.66	
Water-right operation and maintenance charges	12,407.77	
		76,824.26
Inventories:		
Mercantile stores	1,001.11	
Equipment in use—		
Animals $4,329.00		
Mechanical and other 46,293.79		
	50,622.79	
Materials, supplies, etc., in storehouses	31,173.42	
Cement	826.92	
Structural iron and steel	1,345.40	
Lumber	8,978.39	

Inventories—Continued.			
Explosives		$277.90	
Products of local operations		461.36	
Goods in transit		308.30	
Unadjusted transfers between projects		[1] 1.50	
Undistributed cost on inventory property (freight and handling)		[1] 4,873.52	
			$90,120.57
Improvements to land:			
Gross cost		3,771,561.78	
Less credits from incidental operations—			
Rentals of cottages	$6,110.27		
Rentals of grazing lands	101.00		
Rentals of irrigating water	4.90		
Rentals, telephones	102.10		
Revenues, miscellaneous	903.02		
Loss on mess operations	[1] 10,361.28		
Profits on mercantile stores	2,841.42		
Profits on hospital	686.50		
Adjustments—			
Contractor's freight refunds	19,137.72		
Forfeitures by defaulting bidders and contractors	42,000.00		
		61,525.65	
			3,710,036.13
Deferred operation and maintenance revenues			241,083.79
Total assets			4,118,131.35

LIABILITIES.

Accounts payable:			
Labor		10,134.89	
Purchases		7,614.70	
Freight and express		6,414.91	
Passenger fares		399.28	
Miscellaneous		10,719.68	
			35,283.46
Reserves:			
For amortization of original cost by repayment—			
Building charges accrued	244,271.82		
Building charges advance collections	1,061.83		
Building charges collections forfeited	2,469.57		
		247,803.22	
For depreciation on plant and equipment		6,688.36	
			254,491.58
Unadjusted credits, net earnings of Government animals			269.50
Net investment:			
Disbursement vouchers	4,111,296.01		
Transfers received	137,100.31		
		4,248,396.32	
Less—			
Collection vouchers	373,554.70		
Transfers issued	46,754.81		
		420,309.51	
			3,828,086.81
Total liabilities			4,118,131.35

[1] Deduct.

Feature costs, Shoshone project, to June 30, 1913.

Storage works (Shoshone Dam and Reservoir):		
Shoshone Dam	$877,186.01	
Lower outlet tunnel	20,975.96	
Sluice gates	70,435.19	
Upper outlet tunnel	21,020.59	
Lands submerged by reservoir	213,836.80	
Lands damaged by wind-blown sand and silt, surveys and examination	111.43	
		$1,203,565.98
North Canal, examination and surveys		41,088.36
Corbett diverting works:		
Corbett Dam	97,467.80	
Corbett Tunnel	1,137,656.00	
Settling basin, dam, and spillway	25,314.16	
		1,260,437.96
Garland Canal and laterals:		
Surveys	9,309.04	
Structures	283,217.32	
Earthwork	656,150.30	
Ralston Reservoir	17,056.81	
		965,733.47
Frannie Canal extension and laterals:		
Surveys and examination	11,593.53	
Structures	442.88	
		12,036.41
Willwood diverting system	1,036.00	
Willwood canals and laterals	12,307.03	
		13,343.03
Roads and highways:		
Roads around Shoshone Reservoir	117,533.40	
Garland Flat roads	1,952.43	
		119,485.83
Telephone system:		
Construction	3,066.40	
Maintenance	1,517.06	
		4,583.46
Highway bridges:		
Across Garland Canal	8,408.36	
Across laterals Garland Canal	5,906.97	
Sublateral road crossings	5,576.54	
Shoshone Reservoir highway	12,093.88	
		31,985.75
Buildings:		
At Shoshone Reservoir	7,818.04	
On Garland Flat	35,622.84	
At Ralston Reservoir	539.38	
Frannie Canal extension	1,729.58	
		45,709.84
Irrigable lands, farm-unit subdivision		9,444.13
Examination of project as a whole		62,045.46
Stream gauging		140.60
Inventory of cost ledger supplies		1,961.50
Total building cost		3,771,561.78
Operation and maintenance:		
Operation, all features	54,419.94	
Maintenance, all features	40,469.53	
Underground drainage	172,314.55	
Surface drainage	7,801.15	
Miscellaneous	35,729.88	
Demonstration farm	1,842.18	
		312,577.23
Total building and operation and maintenance cost		4,084,139.01

Operating revenues and expenses, Shoshone project, to June 30, 1913.

EXPENSES.

Development:		
Operation	$8,042.16	
Maintenance	5,007.07	
		$13,049.23
Carriage:		
Operation	16,620.97	
Maintenance	6,532.65	
		23,153.62
Distribution:		
Operation	28,562.46	
Maintenance	63,283.48	
		91,845.94
Drainage:		
Operation	1,194.35	
Maintenance	181,491.91	
		182,686.26
Undistributed expenses		1,842.18
		312,577.23

REVENUES.

Operation and maintenance, accruals	68,133.63
Operation and maintenance, forfeitures	1,560.53
Operation and maintenance, advance payments	1,621.05
Rentals of irrigating water	178.23
Deferred operation and maintenance revenues	241,083.79
	312,577.23

Estimated cost of contemplated work, Shoshone project.

Drainage	$230,000
Additional rights of way (Shoshone Reservoir)	5,000
Canal extensions	110,000
Roads	8,000
Extensions to telephone system	2,000
Total	355,000

APPENDIX.

LEGISLATION.

RECLAMATION ACT.

An Act Appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June 30, 1901, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the 5 per cent of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the " reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semiarid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act: *Provided*, That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the act of August 30, 1890, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agricultural and the mechanic arts, established under the provisions of an act of Congress approved July 2, 1862," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from any moneys in the Treasury not otherwise appropriated.

SEC. 2. That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project; also the cost of works in process of construction as well as of those which have been completed.

SEC. 3. That the Secretary of the Interior shall, before giving the public notice provided for in section 4 of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act, and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works: *Provided*, That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof, and of the necessary maps, plans, and estimates of cost, the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined to be impracticable or unadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than 40 nor more than 160 acres, and shall be subject to the limitations, charges, terms, and conditions herein provided: *Provided*, That the commutation provisions of the homestead laws shall not apply to entries made under this act.

SEC. 4. That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project, and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding 10, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably: *Provided*, That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon.

SEC. 5. That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the Government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract exceeding 160 acres to any one landowner, and no such sale shall be

made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act.

SEC. 6. That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided*, That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided*, That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the Government until otherwise provided by Congress.

SEC. 7. That where in carrying out the provisions of this act it becomes necessary to acquire any rights or property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney-General of the United States upon every application of the Secretary of the Interior, under this act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice.

SEC. 8. That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

SEC. 9.[1] That it is hereby declared to be the duty of the Secretary of the Interior in carrying out the provisions of this act, so far as the same may be practicable and subject to the existence of feasible irrigation projects, to expend the major portion of the funds arising from the sale of public lands within each State and Territory here-

[1] Sec. 9 of this act repealed by the act of June 25, 1910.

inbefore named for the benefit of arid and semiarid lands within the limits of such State or Territory: *Provided*, That the Secretary may temporarily use such portion of said funds for the benefit of arid or semiarid lands in any particular State or Territory hereinbefore named as he may deem advisable, but when so used the excess shall be restored to the fund as soon as practicable, to the end that ultimately, and in any event, within each ten-year period after the passage of this act, the expenditures for the benefit of the said States and Territories shall be equalized according to the proportions and subject to the conditions as to practicability and feasibility aforesaid.

SEC. 10. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect.

Approved, June 17, 1902 (32 Stat., 388).

ASSIGNMENT OF DESERT-LAND ENTRIES.

An Act Relating to partial assignments of desert-land entries within reclamation projects made since March twenty-eighth, nineteen hundred and eight.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a desert-land entry within the exterior limits of a Government reclamation project may be assigned in whole or in part under the act of March twenty-eighth, nineteen hundred and eight, Thirty-fifth Statutes at Large, fifty-two, and the benefits and limitations of the act of June twenty-seventh, nineteen hundred and six, Thirty-fourth Statutes at Large, five hundred and twenty, shall apply to such desert-land entryman and his assignees: *Provided*, That all such assignments shall conform to and be in accordance with farm units to be established by the Secretary of the Interior upon the application of the desert-land entryman. All such assignments heretofore made in good faith shall be recognized under this act.

Approved July 24, 1912 (37 Stat., 200).

PATENTS ON RECLAMATION ENTRIES, ETC.

An Act Providing for patents on reclamation entries, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any homestead entryman under the act of June seventeenth, nineteen hundred and two, known as the reclamation act, including entrymen on ceded Indian lands, may, at any time after having complied with the provisions of law applicable to such lands as to residence, reclamation, and cultivation, submit proof of such residence, reclamation, and cultivation, which proof, if found regular and satisfactory, shall entitle the entryman to a patent, and all purchases of water-right certificates on reclamation projects shall be entitled to a final water-right certificate upon proof of the cultivation and reclamation of the land to which the certificate applies, to the extent required by the reclamation act for homestead entrymen: *Provided*, That no such patent or certificate shall issue until all sums due the

United States on account of such land or water right at the time of issuance of patent or certificate have been paid.

SEC. 2. That every patent and water-right certificate issued under this act shall expressly reserve to the United States a prior lien on the land patented or for which water right is certified, together with all water rights appurtenant or belonging thereto, superior to all other liens, claims, or demands whatsoever for the payment of all sums due or to become due to the United States or its successors in control of the irrigation project in connection with such lands and water rights.

Upon default of payment of any amount so due title to the land shall pass to the United States free of all encumbrance, subject to the right of the defaulting debtor or any mortgagee, lien holder, judgment debtor, or subsequent purchaser to redeem the land within one year after the notice of such default shall have been given by payment of all moneys due, with eight per centum interest and cost. And the United States, at its option, acting through the Secretary of the Interior, may cause land to be sold at any time after such failure to redeem, and from the proceeds of the sale there shall be paid into the reclamation fund all moneys due, with interest as herein provided, and costs. The balance of the proceeds, if any, shall be the property of the defaulting debtor or his assignee: *Provided*, That in case of sale after failure to redeem under this section the United States shall be authorized to bid in such land at not more than the amount in default, including interest and costs.

SEC. 3. That upon full and final payment being made of all amounts due on account of the building and betterment charges to the United States or its successors in control of the project, the United States or its successors, as the case may be, shall issue upon request a certificate certifying that payment of the building and betterment charges in full has been made and that the lien upon the land has been so far satisfied and is no longer of any force or effect except the lien for annual charges for operation and maintenance: *Provided*, That no person shall at any one time or in any manner, except as hereinafter otherwise provided, acquire, own, or hold irrigable land for which entry or water-right application shall have been made under the said reclamation act of June seventeenth, nineteen hundred and two, and acts supplementary thereto and amendatory thereof, before final payment in full of all installments of building and betterment charges shall have been made on account of such land in excess of one farm unit as fixed by the Secretary of the Interior as the limit of area per entry of public land or per single ownership of private land for which a water right may be purchased respectively, nor in any case in excess of one hundred and sixty acres, nor shall water be furnished under said acts nor a water right sold or recognized for such excess; but any such excess land acquired at any time in good faith by descent, by will, or by foreclosure of any lien may be held for two years and no longer after its acquisition; and every excess holding prohibited as aforesaid shall be forfeited to the United States by proceedings instituted by the Attorney General for that purpose in any court of competent jurisdiction; and this proviso shall be recited in every patent and water-right certificate issued by the United States under the provisions of this act.

SEC. 4. That the Secretary of the Interior is hereby authorized to designate such bonded fiscal agents or officers of the Reclamation Service as he may deem advisable on each reclamation project, to whom shall be paid all sums due on reclamation entries or water rights, and the officials so designated shall keep a record for the information of the public of the sums paid and the amount due at any time on account of any entry made or water right purchased under the Reclamation Act; and the Secretary of the Interior shall make provision for furnishing copies of duly authenticated records of entries upon payment of reasonable fees, which copies shall be admissible in evidence, as are copies authenticated under section eight hundred and eighty-eight of the Revised Statutes.

SEC. 5. That jurisdiction of suits by the United States for the enforcement of the provisions of this act is hereby conferred on the United States district courts of the districts in which the lands are situated.

Approved, August 9, 1912. (37 Stat., 265.)

CONVEYANCE OF BLOCK IN POWELL TOWN SITE TO SCHOOL DISTRICT.

An Act Making a grant of lands for school purposes in block numbered thirty-one, town site of Powell, Shoshoni reclamation project, Wyoming.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is hereby authorized and directed to issue patent conveying block thirty-one, town site of Powell, on Shoshoni reclamation project, Wyoming, to school district numbered two, Park County, Wyoming.

Approved, August 21, 1912. (37 Stat., 322.)

INDIAN IRRIGATION, FISCAL YEAR 1913.

An Act Making appropriations for the current and contingent expenses of of the Bureau of Indian Affairs, for fulfilling treaty stipulations with various Indian tribes, and for other purposes, for the fiscal year ending June thirtieth, nineteen hundred and thirteen.

* * * * * * *

CALIFORNIA.

* * * For the balance of the first annual reclamation and maintenance charge on Yuma allotments and for the second annual charge and maintenance, $52,362.62, or so much thereof as may be required, to be reimbursed from the sale of surplus lands or from other funds that may be available, in accordance with the provisions of the act of March 3, 1911. (37 Stat., 523.) * * *

* * * * * * *

MONTANA.

* * * That so much of the act of Congress approved March three, nineten hundred and eleven (36 Stat. L., 1066), which provides for the reservation of an easement over tracts of land bordering Flathead Lake, Montana, be, and the same hereby is, amended to read as follows: "That an easement in, to, and over all lands bordering on or

adjacent to Flathead Lake, Montana, which lie below an elevation of nine feet above the high-water mark of said lake for the year 1909, is hereby reserved for uses and purposes connected with storage for irrigation or development of water power, and all patents hereafter issued for any such lands shall recite such reservation." (37 Stat., 527.) * * *

* * * * * * *

WASHINGTON.

* * * That the Secretary of the Interior be, and he is hereby, authorized and directed to investigate the conditions on the Yakima Indian Reservation in the State of Washington with a view to determine the best, most practicable and most feasible plan for providing water for such lands of said reservation as may be irrigated and to cause surveys, plans, and reports to be made thereon, together with an estimated limit of cost of such irrigation project and to submit his report thereon to Congress on the first Monday in December, 1912, together with such facts and reasons in support of the same as may be necessary to advise Congress fully in regard thereto.

Approved, August 24, 1912. (37 Stat., 538.)

* * * * * * *

PATENTS ON DESERT-LAND ENTRIES, ETC.

An Act Making appropriations to supply deficiencies in appropriations for the fiscal year nineteen hundred and twelve and for prior years, and for other purposes.

* * * * * * *

That any desert-land entryman whose desert-land entry has been embraced within the exterior limits of any land withdrawal or irrigation project under the act of June 17, 1902, known as the reclamation act, and who may have obtained a water supply for the land embraced in any such desert-land entry from the reclamation project by the purchase of a water-right certificate, may at any time after having complied with the provisions of the law applicable to such lands and upon proof of the cultivation and reclamation of the land to the extent required by the reclamation act for homestead entrymen, submit proof of such compliance, which proof, if found regular and satisfactory, shall entitle the entryman to a patent and a final water-right certificate under the same terms and conditions as required of homestead entrymen under act entitled "An act providing for patents on reclamation entries, and for other purposes, approved August 9, 1912."

* * * * * * *

Approved, August 26, 1912. (37 Stat., 610.)

CORBETT TUNNEL CLAIMS.

Joint Resolution Appropriating money for the payment of certain claims on account of labor, supplies, materials, and cash furnished in the construction of the Corbett Tunnel.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That there be, and is hereby, appropriated out of any moneys in the reclamation fund in

the Treasury the sum of forty-two thousand dollars, or so much thereof as may be necessary, for the payment of and to be paid to those persons who have and hold and who have presented, or may present, claims, remaining unpaid, on account of labor, supplies, materials, or cash furnished to the contractor or the subcontractor and used in the construction of the Corbett Tunnel, as a part of the Shoshone irrigation project, in the State of Wyoming, under any contract or contracts let for that purpose by the Government of the Uniten States; and the Secretary of the Interior is hereby authorized and directed to forthwith, and as soon as may be, investigate, hear evidence about, determine, and declare the several amounts due and remaining unpaid, if any, on account thereof, and to whom so due, and to certify the amounts due to the Secretary of the Treasury, who is hereby authorized to pay the several amounts so ascertained to the persons entitled to the same.

Approved, August 24, 1912. (37 Stat., 643.)

BRIDGE ACROSS SNAKE RIVER IN JACKSON HOLE, WYO.

An Act To provide for a bridge across Snake River, in Jackson Hole, Wyoming.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is hereby authorized to use such portion of the reclamation fund, not to exceed twenty-seven thousand dollars, and in no event more than three-fourths of the sum that may be necessary for the construction of a bridge across Snake River, at a point in township forty-one or forty-two north, range one hundred and sixteen or one hundred and seventeen west, Wyoming, to be determined by the Reclamation Service, with the view of best serving the people of Jackson Hole and adjacent territory in Wyoming: *Provided*, That no part of the funds herein authorized to be used, except as may be necessary for the making of examinations and estimates, shall be expended until the Secretary of the Interior shall have obtained, from the proper local authorities, satisfactory guarantees of the payment by the said local authorities of one-fourth of the cost of said bridge; and that the said local authorities assume full responsibility for, and will at all times maintain and repair the said bridge and approaches thereto: *Provided further*, That the amount of the reclamation fund so used shall be charged as a part of the cost of the reclamation project or projects, the construction and development of which have caused the necessity of such bridge.

Approved, March 3, 1913 (37 Stat., 730).

COOPERATION WITH BUREAU OF PLANT INDUSTRY.[1]

An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and fourteen.

* * * * * * *

For investigations in connection with western irrigation agriculture, the utilization of lands reclaimed under the reclamation act, and other areas in the arid and semiarid regions, $75,000. * * *

Approved, March 4, 1913 (37 Stat., 836).

[1] For previous similar legislation, see act Mar. 4, 1909 (35 Stat. L., 1045), $76,680; act May 26, 1910 (36 Stat. L., 422), $74,380; act Mar. 4, 1911 (36 Stat. L., 1243), $73,060; act Aug. 10, 1912 (37 Stat. L., 277), $69,600.

OFFICE BUILDING IN WASHINGTON, D. C.

An Act To increase the limit of cost of certain public buildings, to authorize the enlargement, extension, remodeling, or improvement of certain public buildings, to authorize the erection and completion of public buildings, to authorize the purchase of sites for public buildings, and for other purposes.

* * * * * * *

SEC. 9. That the Secretary of the Treasury be, and he is hereby, authorized and directed to cause to be constructed on square numbered one hundred and forty-three, in the city of Washington, District of Columbia, a fireproof building of modern office building type of architecture of sufficient area to afford, when completed, office accommodations for the entire organization at Washington, District of Columbia, of the Geological Survey, Reclamation Service, Indian Office, Bureau of Mines, and such other offices and bureaus of the Interior Department as can be accommodated therein.

That the plans, specifications, and estimates for said building shall be approved by a board consisting of the Secretary of the Treasury, the Secretary of the Interior, and the Superintendent of the Capitol Building and Grounds.

That, for the purpose of beginning the construction of said building the sum of $596,000 is hereby authorized, and the unexpended balance of the appropriation for the acquisition of said square one hundred and forty-three is hereby made available as a part of said authorization for the employment, at customary rates of compensation without regard to civil service laws, rules, or regulations, of technical and engineering services in the Office of the Supervising Architect, exclusively to aid in the preparation of the necessary plans, specifications, estimates, and toward the commencement of the construction of said building.

That the foregoing authorization for the employment of technical and engineering services shall be in addition to and independent of the authorizations and appropriations for personal services for the Office of the Supervising Architect otherwise made: *Provided*, That this authorization shall not be construed as fixing the limit of cost of said building at the sum hereby named, but the building hereby authorized shall be constructed or so planned as to cost, complete, including fireproof vaults, heating and ventilating apparatus, elevators, lighting fixtures, and approaches, but exclusive of site, not exceeding $2,596,000.

That the Secretary of the Treasury be, and he is hereby, authorized and directed to enter into contracts for the construction of a suitable building for said purposes within the ultimate limit of cost above mentioned. * * * Approved March 4, 1913 (37 Stat., 880–881).

INDIAN IRRIGATION, FISCAL YEAR 1914.

An Act Making appropriations for the current and contingent expenses of the Bureau of Indian Affairs, for fulfilling treaty stipulations with various Indian tribes, and for other purposes, for the fiscal year ending June thirtieth, nineteen hundred and fourteen.

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Provided further, That nothing herein contained shall be construed to prevent the Bureau of Indian Affairs from having the

benefit of consultation with engineers in other branches of the public service or carrying out existing agreements with the Reclamation Service.[1] * * *

ARIZONA AND NEW MEXICO.

For maintenance, care, and protection of machinery and irrigation wells already completed, in connection with the irrigation of the lands of the Pima Indians in the vicinity of Sacaton, in the Gila River Reservation, $5,000.[2] * * *

CALIFORNIA.

For reclamation and maintenance charge on Yuma allotments, $40,000, to be reimbursed from the sale of surplus lands or from other funds that may be available, in accordance with the provisions of the act of March third, nineteen hundred and eleven. * * *

MONTANA.

For continuing the construction of irrigation systems to irrigate the allotted lands of the Indians of the Flathead Reservation, in Montana, and the unallotted irrigable lands to be or which have been heretofore disposed of under authority of law, including the necessary surveys, plans, and estimates, $325,000, to be immediately available, reimbursable in accordance with the provisions of the act of April fourth, nineteen hundred and ten.

For continuing the construction of irrigation systems to irrigate the allotted lands of the Indians of the Blackfeet Indian Reservation, in Montana, and the unallotted irrigable lands to be disposed of under authority of law, including the necessary surveys, plans, and estimates, $150,000, reimbursable in accordance with the provisions of the act of March first, nineteen hundred and seven.

For continuing construction of irrigation systems to irrigate allotted lands of the Indians of the Fort Peck Indian Reservation, in Montana, including necessary surveys, plans, and estimates, $150,000, the same to be reimbursable.[3]

WASHINGTON.

For extension and maintenance of the irrigation system on lands allotted to Yakima Indians, in Washington, $15,000, reimbursable in accordance with the provisions of the act of March first, nineteen hundred and seven. * * *

A commission consisting of two members of the Senate Committee on Indian Affairs, to be appointed by the chairman of said committee, and two Members of the House of Representatives, to be appointed by the Speaker, is hereby created for the purpose of investigating the necessity and feasibility of establishing, equipping, and maintaining a tuberculosis sanitarium in New Mexico for the treatment of tuberculous Indians, and to also investigate the necessity and feasibility of procuring impounded waters for the Yakima Indian Reservation or

[1] Same provision in Indian Appropriation Act for fiscal year ending June 30, 1913; see act of Aug. 24, 1912, 37 Stat., 518.
[2] For similar provision for fiscal year ending June 30, 1913, see act of Aug. 24, 1912, 37 Stat., 522.
[3] For similar provision for fiscal year ending June 30, 1913, see act of Aug. 24, 1912, 37 Stat., 526.

the construction of an irrigation system upon said reservation, to impound the waters of the Yakima River, Washington, for the reclamation of the lands on said reservation, and for the use and benefit of the Indians of said reservation. That said commission shall have full power to make the investigations herein provided for, and shall have authority to subpœna and compel the attendance of witnesses, administer oaths, take testimony, incur expenses, employ clerical help, and do and perform all acts necessary to make a thorough and complete investigation of the subjects herein mentioned, and that said commission shall report to Congress on or before January first, nineteen hundred and fourteen: *Provided*, That one-half of all necessary expenses incident to and in connection with the making of the investigation herein provided for, including traveling expenses of the members of the commission, shall be paid from the contingent fund of the House of Representatives and one-half from the contingent fund of the Senate on vouchers therefor signed by the chairman of the said commission, who shall be designated by the members of the said commission.

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Approved, June 30, 1913. (Public, No. 4.)

PURCHASES OF RIGHTS AND PROPERTY.

The following purchases of rights and property were made during the fiscal year ended June 30, 1913:

Purchases of rights and property.

ARIZONA, SALT RIVER PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Bartlett Heard Land & Cattle Co.	San Francisco Canal	$12,840.00	Dec. 31, 1912
Packard Investment Co	A strip of land in the south part of NE. ¼ of sec. 12, T. 1 S., R. 4 E., G. & S. R. B. & M.	740.25	Dec. 24, 1912
Peck, Thos. W. & E	A parcel of land in NE. ¼ sec. 7, T. 1 N., R. 1 E., G. & S. R. B. & M.	100.00	Feb. 17, 1913
Winslow, H. O. & I. M	A parcel of land in E. ½, NE. ¼ sec. 10, T. 1 S., R. 4 E., G. & S. R. B. & M.	1,684.00	Apr. 9, 1913

ARIZONA-CALIFORNIA, YUMA PROJECT.

Andrews, Geo. Y., and wife	Improvements on strip of land in lot 3, sec. 33, T. 16 S., R. 22 E., S. B. M.	$400.00	Mar. 4, 1913
Athey, R. E., and wife	Improvements on strip of land in NE. ¼ NW. ¼ sec. 5, T. 9 S., R. 23 W., G. & S. R. M.	84.00	Aug. 22, 1912
Bridge, G. M., and wife	Strip of land in lot 32 in east half block 3 of Townsend tract, in lot 2, sec. 20, T. 8 S., R. 23 W., G. & S. R. M., containing 0.15 acre.	200.00	June 15, 1912
Curtis, Emil W., and wife	Improvements on strip of land in NW. ¼ NW. ¼ sec. 5, T. 9 S., R. 23 W., G. & S. R. M.	72.00	Mar. 21, 1913
Garvin, C. A., and wife	Strip of land in N. ½ SW. ¼ sec. 4, T. 10 S., R. 24 W. G. & S. R. M. (improvements).	25.00	Oct. 24, 1912
Hopkins, Carrol C	Improvements on strip of land in east 70 acres of SW. ¼ sec. 10, T. 10 S., R. 24 W., G. & S. R. M.	250.00	Jan. 20, 1913
Jacobs, Ralph C., trustee, acting for Mabel C. Hinds.	Improvements on strip of land in E. ½ SE. ¼ NW. ¼ sec. 25, T. 9 S., R. 24 W., G. & S. R. M.	84.00	July 22, 1912
Jones, W. J., administrator	Improvements on strip of land in E. ½ SE. ¼ sec. 23, T. 9 S., R. 24 W., G. & S. R. M.	85.00	Jan. 27, 1913
Jordan, A. C	Improvements on strip of land in SW. ¼ SE. ¼ sec. 32, T. 8 S., R. 23 W., G. & S. R. M.	75.00	Aug. 21, 1912
Do	Improvements on strip of land in E. ½ SW. ¼ SW. ¼ sec. 5, T. 9 S., R. 23 W., G. & S. R. M.	30.00	Do.

Purchases of rights and property—Continued.

ARIZONA-CALIFORNIA, YUMA PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Karr, L. E., and wife, and H. C. Kester.	Lot 1 of block 1 of Townsend tract; the north 160-feet strip in block 17 of Townsend tract, and a portion of block 19, Townsend tract, Yuma, containing 2.65 acres.	$998.00	June 27, 1912
McClelland, Elizabeth	Improvements on strip of land in NW. ¼ SW. ¼ sec. 12, T. 9 S., R. 24 W., G. & S. R. M.	155.00	June 18, 1912
Merrill, S. T., and wife	Improvements on strip of land in W. ½ NW. ¼ SE. ¼ sec. 25, T. 8 S., R. 24 W., G. & S. R. M.	35.00	June 10, 1912
Molina, Ida K	Improvements on strip of land in SE. ¼ sec. 17, T. 10 S., R. 24 W., G. & S. R. M.	75.00	July 1, 1912
Mumm, Jacob, jr	Improvements on strip of land in N. ½ SW. ¼ NE. ¼ sec. 25, T. 8 S., R. 24 W., G. & S. R. M.	35.00	Aug. 14, 1912
Pike, Albert	Improvements on strip of land in SW. ¼ SE. ¼ sec. 29, and NW. ¼ NE. ¼ sec. 32, T. 8 S., R. 23 W., G. & S. R. M.	120.00	July 2, 1912
Sherwin, John J	Improvements on strip of land in SE. ¼ fractional sec. 20, T. 8 S., R. 23 W., G. & S. R. M.	350.00	June 4, 1912
Smith, Ann E	Improvements on strip of land in NW. ¼ NW. ¼ sec. 31, T. 8 S., R. 23 W., G. & S. R. M.	34.00	Apr. 16, 1913
Smith, Earl T., and wife	Improvements on strip of land in S. ½ SW. ¼ sec. 4, T. 10 S., R. 24 W., G. & S. R. M.	116.00	Feb. 28, 1913
Do	Improvements on strip of land in SW. ¼ SW. ¼ sec. 4 and NW. ¼ NW. ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M.	226.00	Aug. 22, 1912
Timmons, W. F., and wife	Improvements on strip of land in SE. ¼ NE. ¼ sec. 12, T. 9 S., R. 24 W., G. & S. R. M.	210.00	June 29, 1912
Tuttle, Allyn R., and wife	Improvements on strip of land in N. ½ SW. ¼ sec. 12, T. 10 S., R. 24 W., G. & S. R. M.	182.00	Oct. 3, 1912
Williams, Chas. R., and wife	Improvements on strip of land in E. ½ SW. ¼ sec. 25, T. 8 S., R. 24 W., G. & S. R. M.	170.40	Mar. 5, 1913
	CALIFORNIA, ORLAND PROJECT.		
Donohoe, Charles L., and wife.	Strips of land through N. ½ and SE. ¼ sec. 18, T. 22 N., R. 2 W., M. D. B. & M.	$1.00	June 28, 1912
Ehorn, S. F., and wife	Strips of land through secs. 1 and 2, T. 22 N., R. 3 W., M. D. B. & M.	1.00	June 21, 1913
Greenwood, W. A., and wife	Strips of land 30 feet wide through S. ½ sec. 16, SW. ¼ sec. 15, T. 22 N., R. 3 W., M. D. B. & M.; and 30-foot strips through W. ½ sec. 4 and NW. ¼ sec. 9, T. 21 N., R. 3 W., M. D. B. & M.; 20-foot strips through SW. ¼ sec. 15, the SW. ¼ and the SE. ¼ sec. 16, T. 22 N., R. 3 W., M. D. B. & M.; and through W. ½ sec. 4, T. 21 N., R. 3 W., M. D. B. & M., 13.17 acres.	1.00	Apr. 29, 1911
Scearce, W. E., administrator, and others.	Strip of land through NW. ¼ NE. ¼ and SE. ¼ sec. 4, SW. ¼ and SE. ¼ sec. 3, NE. ¼ sec. 10, T. 22 N., R. 4 W., M. D. B. & M., 18.2 acres.	1,000.00	Dec. 31, 1912
Shaw, Lucy Ann	Strip of land 40 feet wide through NE. ¼ sec. 13, T. 22 N., R. 3 W., M. D. B. & M.	96.00	Nov. 4, 1912
Wacaser, A., and others	Strip of land 30 feet wide through SW. ¼ NW. ¼ sec. 23, T. 22 N., R. 3 W., M. D. B. & M., 0.4 acre.	1.00	Feb. 27, 1913
	COLORADO, GRAND VALLEY PROJECT.		
Abair, A. J	Improvements on right of way across NW. ¼ SW. ¼ NE. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	$1,200	July 23, 1912
Anderson, James B. and Carrie J.	Improvements on right of way across W. ½ E. ½ SE. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	3,050	Dec. 27, 1912
Bancroft, R. H	Improvements on right of way across E. ½ W. ½ E. ½ NE. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,875	July 22, 1912
Best, John E	Improvements on right of way across a 532-foot strip off east side of lot 4 and SW. ¼ NW. ¼ sec. 12, T. 11 S., R. 98 W., 6th M.	2,150	July 26, 1912
Boals, M. C	Improvements on right of way across N. 5¾ acres of W. ½ E. ½ NW. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	2,875	Aug. 28, 1912
Bowman, G. W	Improvements on right of way across E. 25 acres of SE. ¼ NE. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	1,350	July 24, 1912
Bowman, Nancy C	Improvements on right of way across N. 22½ acres of SW. ¼ NW. ¼ sec. 1, T. 1 S., R. 1 E., Ute M.	2,100	Do.
Bridegroom, Julius and Corilla	Right of way across E. 10 acres of S. 30 acres lot 3, sec. 4, T. 1 S., R. 1 E., Ute M.	1,200	July 3, 1912

Purchases of rights and property—Continued.

COLORADO, GRAND VALLEY PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Brown, Lewis	Improvements on right of way across E. 10 acres of W. 20 acres of S. 30 acres of SW. ¼ NW. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	$1,300	July 23, 1912
Bunte, Fred E. and George H.	Improvements on right of way across E. ½ E. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,340	Nov. 9, 1912
Do	Improvements on right of way across W. ½ E. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,340	Nov. 18, 1912
Burckhalter, D. A	Improvements on right of way across W. ¼ NE. ¼ SW. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	100	Sept. 12, 1912
Burns, F. M	Right of way across E. ½ W. ½ SW. ¼ NE. ¼ sec. 4, T. 1 S., R. 1 E., Ute M.	700	July 5, 1912
Buschlen, Simeon	Improvements on right of way across W. 19/16 E. ½ lot 2, sec. 9, T. 11 S., R. 98 W., 6th M.	2,825	Aug. 31, 1912
Cameo Coal & Land Co	Improvements on right of way across SE. ¼ NE. ¼ and NE. ¼ SE. ¼ sec. 27, T. 10 S., R. 98 W., 6th M.	7,120	Mar. 29, 1913
Canfield, G. D. and Mary L	Improvements on right of way across E. ½ W. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,300	July 25, 1912
Clinton, James L., and estate of Mrs. Emma May Starkweather.	Improvements on right of way across W. ½ E. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,400	Jan. 21, 1913
Colcord, J. W	Improvements on right of way across W. ⅞ SW. ¼ NE. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	1,750	Aug. 8, 1912
Craddick, James I	Improvements on right of way across E. ½ W. ½ E. ½ SW. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,425	Oct. 21, 1912
Cutter, Charles	Improvements on right of way across NE. ¼ NE. ¼ NE. ¼ sec. 8, T. 11 S., R. 98 W., 6th M., above Price ditch.	1,450	Oct. 18, 1912
Davis, A. M	Improvements on right of way across NE. ¼ SE. ¼ NW. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	1,500	July 19, 1912
Deardorff, Addison W	Improvements on right of way across E. ½ NE. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,325	Nov. 9, 1912
De Long, Horace T	Improvements on right of way across E. ½ NW. ¼ SW. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	150	Oct. 30, 1912
Detweiler, Eli R	Improvements on right of way across W. 5 acres of E. ½ W. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M	1,275	Aug. 26, 1912
Drake, J. W	Improvements on right of way across E. ¼ lot 2, sec. 1, T. 1 S., R. 1 E., Ute M.	900	July 20, 1912
Eakin, J. C	Improvements on right of way across W. ½ E. ½ NW. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,750	Aug. 20, 1912
Echternach, John A	Improvements on right of way across W. ½ lot 2, sec. 9, T. 11 S., R. 98 W., 6th M.	5,550	July 23, 1912
Epperson, William Albert and Hardy.	Improvements on right of way across NW. ¼ SE. ¼ NW. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	1,700	Aug. 16, 1912
Farnsworth, A. H	Improvements on right of way across W. 10 acres, lot 2, sec. 1, T. 1 S., R. 1 E., Ute M.	1,350	July 27, 1912
Farnsworth, G. H	Improvements on right of way across E. ½ W. ½ lot 2, sec. 1, T. 1 S., R. 1 E., Ute M.	1,250	July 29, 1912
Folsom, F. J., and others	Improvements on right of way across E. ¾ SE. ¼ SW. ¼ sec. 32, T. 1 N., R. 1 E., Ute M.	1,500	Aug. 7, 1912
Forry, Nannie E	Improvements on right of way across W. ¾ lot 4, sec. 5, T. 1 S., R. 1 E., Ute M.	450	Sept. 3, 1912
Freemyer, Carrie	Improvements on right of way across W. 7 acres N. ½ NW. ¼ NE. ¼ sec. 7, T. 11 S., R. 98 W., 6th M.	1,175	Nov. 25, 1912
Freyermuth, Netta E	Improvements on right of way across W. ¼ E. ½ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,300	Sept. 21, 1912
Fuller, Charles H., and White, Henry C.	Right of way across W. ½ SW. ¼ NE. ¼ sec. 4, T. 1 S., R. 1 E., Ute M.	100	July 23, 1912
Grand Junction Mining & Fuel Co.	Improvements on right of way across NW. ¼ NW. ¼ sec. 34, T. 10, S., R. 98 W., 6th M.	11,300	Mar. 29, 1913
Grant, James C	Improvements on right of way across W. ½ E. ½ lot 2, sec. 1, T. 1 S., R. 1 E., Ute M.	1,000	July 22, 1912
Grenamyre, Edna D., and others.	1/20 interest in improvements on right of way across E. ½ SW. ¼ NE. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	2,375	Nov. 7, 1912
Griffith, T. J	Improvements on right of way across W. ¼ NW. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,900	July 29, 1912
Hampton, Charles H	Improvements on right of way across E. ½ W. ½ NW. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	2,750	Oct. 24, 1912
Hart, W. S	Improvements on right of way across N. 10 acres and E. ½ of S. 30 acres SW. ¼ NW. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	1,500	July 20, 1912
Harvey, Howard L	Improvements on right of way across SW. ¼ NW. ¼ and NW. ¼ SW. ¼ sec. 13, T. 10 S., R. 98 W., 6th M.	1,150	Dec. 6, 1912
Hawker, Henry	Improvements on right of way across SW. ¼ NE. ¼ sec. 12, T. 11 S., R. 99 W., 6th M.	5,500	Aug. 9, 1912

Purchases of rights and property—Continued.

COLORADO, GRAND VALLEY PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Hendee, Albert L	Improvements on right of way across E. 6 acres of E. ½ lot 2, lying N. of railroad right of way, in sec. 9, T. 11 S., R. 98 W., 6th M.	$575	Dec. 28, 1912
Huckleberry, Warren	Improvements on right of way across W. ¼ lot 2, sec. 4, T. 1 S., R. 1 E., Ute M.	750	July 26, 1912
Hugus, J. W., & Co	Improvements on right of way across W. 4 acres of NE. ¼ NW. ¼ NE. ¼ and E. 3 acres of NW. ¼ NW. ¼ NE. ¼ sec. 7, T. 11 S., R. 98 W., 6th M.	2,500	Nov. 25, 1912
Jackson, H. L	Interest in E. ½ SW. ¼ NE. ¼ sec. 3, T. 1 S., R. 1 E., Ute P. M.	375	Nov. 7, 1912
John, G. H	Improvements on right of way across W. ⅛ SW. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,000	Nov. 14, 1912
John, P. M	Improvements on right of way across E. ½ W. ¼ SW. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,550	Mar. 25, 1913
Kern, Lewis	Improvements on right of way across W. ½ NE. ¼ and SE. ¼ NW. ¼ sec. 23, T. 10 S., R. 98 W., 6th M.	3,100	June 4, 1913
Kilmer, Daniel B	Improvements on right of way across W. ¼ W. ½ SE. ¼ NE. ¼ and E. ¼ E. ½ SW. ¼ NE. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	900	Aug. 27, 1912
Kluge, Herman W	Improvements on right of way acrsos E. ⅜ W. ⅜ SE. ¼ NE. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	1,150	July 24, 1912
Larkin, John B	Improvements on right of way across NE. ¼ lot 1, sec. 5, T. 1 S., R. 1 E., Ute M.	275	July 29, 1912
Lester, J. A., and Davis, Leona Estella.	Improvements on right of way across west part of lot 3, sec. 11, T. 11 S., R. 99 W., 6th M.	3,100	July 23, 1912
Lloyd, W. H	Improvements on right of way across E. ½ E. ½ E. ½ SW. ¼ sec. 3, T. 11 S., R. 98 W., 6th M.	2,100	Oct. 25, 1912
Do	Improvements on right of way across W. ½ E. ½ SW. ¼ SW. ¼ sec. 3, T. 11 S., R. 98 W., 6th M.	1,800	Nov. 8, 1912
Maze, Kate	Improvements on right of way across a part of lot 4, sec. 12, T. 11 S., R. 99 W., 6th M.	1,850	Aug. 9, 1912
Merrivale Orchards Co	Right of way across E. 20 acres of lot 4 below stub ditch, sec. 4, T. 1 S., R. 1 E., Ute M.	1,900	Sept. 20, 1912
Moncrief Orchards Co	Improvements on right of way across NW. ¼ sec. 6, T. 1 S., R. 2 E., Ute M.	3,325	Sept. 5, 1912
Do	Improvements on right of way across lot 1, sec. 7, T. 11 S., R. 98 W., 6th M.	3,000	Sept. 21, 1912
Morgan, C. J	Improvments on right of way across west part of lot 4, sec. 12, and part of east part of lot 3, sec. 11, T. 11 S., R. 99 W., 6th M.	1,850	July 23, 1912
Morgan, Jefferson G	Improvements on right of way across SE. ¼ NW. ¼ sec. 12, T. 11 S., R. 99 W., 6th M.	2,425	Apr. 3, 1913
Morse, C. T	Improvements on right of way across a 405-foot strip in eastern part of NW. ¼ SE. ¼ SW. ¼, sec. 3, T. 11 S., R. 98 W., 6th M.	2,550	Apr. 7, 1913
Neer, S. J	Improvements on right of way across E. ½ NE. ¼ NE. ¼ NW. ¼ sec. 7, T. 11 S., R. 98 W., 6th M.	1,250	Sept. 10, 1912
Newton, C. A	Improvements on right of way across E. ½ W. ½ SE. ¼ SE. ¼ sec. 6, T. 11 S., R. 98 W., 6th M.	1,325	Aug. 27, 1912
Oliver, John L	Improvements on right of way across W. ¾ E. ½ W. ½ NE. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	2,500	Aug. 20, 1912
Phillips, John M	Improvements on right of way across E. ½ W. ½ lot 2, sec. 4, T. 1 S., R. 1 E., Ute M.	200	Aug. 5, 1912
Port, A. C	Improvements on right of way across W. 10 acres of S. 30 acres of SW. ¼ NW. ¼ sec. 3, T. 1 S., R. 1 E., Ute M.	1,050	July 30, 1912
Port, John A	Improvements on right of way across W. ½ E. ½ SW. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	2,500	July 23, 1912
Port, Marie T	Improvements on right of way across W. 8 rods, of W. ½ W. ½ NE. ¼ NW ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,525	July 24, 1912
Potter, Delos D., and others	Improvements on right of way across N. part of SE. ¼ NE. ¼ sec. 12, T. 11 S., R. 99 W., 6th M.	475	Aug. 6, 1912
Potter, Delos D. and Robert A.	Improvements on right of way across W. ½ W. ½ SW. ¼ SW. ¼ sec. 3, T. 11 S., R. 98 W., 6th M.	1,900.00	July 26, 1912
Ragsdale, J. M	Improvements on right of way across N. 15 acres of W. ½ lot 1, sec. 1, T. 1 S., R. 1 E., Ute M.	2,300.00	July 24, 1912
Rait, A. C	Improvements on right of way across W. ½ E. ½ W. ½ SW. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,575.00	Aug. 29, 1912

Purchases of rights and property—Continued.

COLORADO, GRAND VALLEY PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Reed, C.	Improvements on right of way across E. ½ W. ½ NE. ¼ NW. ¼ and W. ½ E. ½ NE. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	$2,100.00	Aug. 19, 1912
Reed, C. S.	Part NW. ¼ NE. ¼ NW. ¼ sec. 7, T. 11 S., R. 98 W., 6th P. M., 0.58 acre.	450.00	Feb. 8, 1913
Reed, Dana, and Jordan, E. W.	Improvements on right of way across SW. ¼ NE. ¼ NW. ¼ sec. 7, T. 11 S., R. 98 W., 6th M.	4,200.00	Nov. 13, 1912
Reed, Edna M.	Improvements on right of way across NW. ¼ SE. ¼ NW. ¼ sec. 1, T. 1 S., R. 1 E., Ute M.	150.00	Aug. 31, 1912
Reed, T. P.	Improvements on right of way across E. ½ SW. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	2,675.00	Sept. 4, 1912
Richardson, David	Improvements on right of way across SE. ¼ NW. ¼ sec. 2, T. 1 S., R. 1 E., Ute M.	1,450.00	Apr. 1, 1913
Russell, C. B.	Improvements on right of way across 6 acres in NW. corner of lot 2, sec. 7, T. 11 S., R. 98 W., 6th M.	2,900.00	Aug. 10, 1912
Savage, Eugene F.	Improvements on right of way across W. ½ NE. ¼ NE. ¼ NW. ¼ sec. 7, T. 11 S., R. 98 W., 6th M.	650.00	Sept. 24, 1912
Schoonover, Isaac	Improvements on right of way across E. ½ W. ½ E. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,400.00	July 29, 1912
Shideler, H. J.	Improvements on right of way across W. ½ E. ½ SW. ¼ SW. ¼ sec. 3, T. 11 S., R. 98 W., 6th M.	3,825.00	Dec. 28, 1912
Shook, John H.	Improvements on right of way across W. ½ SE. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	2,575.00	July 19, 1912
Shook, J. H.	Improvements on right of way across W. ½ E. ½ lot 1, sec. 1, T. 1 S., R. 1 E., Ute M.	1,600.00	Do.
Simpson, Charlie G.	Improvements on right of way across E. ½ SW. ¼ SE. ¼ sec. 32, T. 1 N., R. 1 E., Ute M.	1,400.00	July 22, 1912
Simpson, C. G., and Arthur, C. H.	Improvements on right of way across SE. ¼ SE. ¼ sec. 32, T. 1 N., R. 1 E., Ute M.	2,300.00	Do.
Skinner, R. M.	Improvements on right of way across 258-foot strip in eastern part of NW. ¼ SE. ¼ SW. ¼ sec. 3, T. 11 S., R. 98 W., 6th M.	2,400.00	Do.
Smith, Harry	Improvements on right of way across W. ½ E. ½ SW. ¼ SE. ¼ sec. 6, T. 11 S., R. 98 W., 6th M.	550.00	Jan. 7, 1913
Snider, John B.	Improvements on right of way across W. ½ SE. ¼ SE. ¼ sec. 6, T. 11 S., R. 98 W., 6th M.	1,325.00	Aug. 6, 1912
Songer, Frank J.	Improvements on right of way across lot 1, sec. 1, T. 1 S., R. 1 E., Ute M.	1,150.00	July 20, 1912
Starkweather, Geo. C., executor, and others.	Part W. ½ W. ½ E. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th P. M., 0.52 acre.	1,400.00	Jan. 21, 1913
Stewart, Ada H.	Improvements on right of way across E. ½ SE. ¼ SE. ¼ sec. 6, T. 11 S., R. 98 W., 6th M.	3,175.00	July 27, 1912
Stickney, Andrew F.	Improvements on right of way across E. 6 acres of W. ½ NE. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	2,100.00	July 24, 1912
Strong, H. E., and Maud C.	Improvements on right of way across E. ½ W. ½ SE. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M	2,875.00	Dec. 27, 1912
Strother, Julius O. and Schabinger, Karl C.	Improvements on right of way across 262-foot strip near center of lot 4, and SW. ¼ NW. ¼ sec. 12, T. 11 S., R. 99 W., 6th M.	1,420.00	July 23, 1912
Tadlock, George	Improvements on right of way across E. ¼ W. ½ SW. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	1,550.00	Jan. 17, 1913
Toothaker, B. W. and Florence N.	Improvements on right of way across W. ½ E. ½ NE. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,875.00	July 24, 1912
Underberg, C. W.	Improvements on right of way across E. ½ NW. ¼ NW. ¼ sec. 9, T. 11 S., R. 98 W., 6th M.	1,775.00	July 27, 1912
West, John O. and Oliver, J. L.	Improvements on right of way across E. ½ W. ½ SW. ¼ SW. ¼ sec. 3, T. 11 S., R. 98 W., 6th M.	2,575.00	Aug 30, 1912
West, Wort and Reed, C. S.	Improvements on right of way across NW. ¼ NE. ¼ NW. ¼ sec. 7, T. 11 S., R. 98 W., 6th M.	450.00	Feb 8, 1913
Wheeler, H. J.	Improvements on right of way across W. ½ SW. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	2,650.00	Aug. 5, 1912
Wheeler, Herbert M.	Improvements on right of way across E. ½ W. ½ SW. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	2,495.00	Oct. 9, 1912
Wilkinson, Frank B.	Improvements on right of way across S. part of SE. ¼ NE. ¼ sec. 12, T. 11 S., R. 99 W., 6th M.	3,800.00	Aug. 8, 1912
Wilson, Emmet and Alderson, James.	Improvements on right of way across E. ½ SW. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	2,300.00	Sept. 23, 1912
Wilson, John, and Masters, W. P.	Right of way across E. ½ SW. ¼ NE. ¼ sec. 4, T. 1 S., R. 1 E., Ute M.	1,410.00	Sept. 13, 1912
Wilt, John R., and others	Part SE. ¼ NE. ¼ sec. 12, T. 11 S., R. 99 W., 6th P. M., 0.35 acre.	475.00	Aug. 6, 1912
Wire, A. B.	Improvements on right of way across E. 10 acres W. ½ SE. ¼ SE. ¼ sec. 6, T. 11 S., R. 98 W., 6th M.	1,875.00	Oct. 1, 1912

Purchases of rights and property—Continued.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Bertorello, Rosa, and others..	Portion of SW. ¼ NE. ¼ sec. 35, T. 48 N., R. 9 W., N. M. P. M., containing 3.33 acres, more or less.	$700.00	May 7, 1912
Davidson, S. C.....	Portion of N. ½ SE. ¼ NW. ¼ sec. 10, T. 50 N., R. 10 W., N. M. P. M., containing 1.55 acres.	115.00	Jan. 10, 1913
Davis, Elizabeth J.....	Portion of W. ½ NE. ¼ sec. 34, T. 15 S., R. 96 W., 6th P. M., containing 1.88 acres.	1.00	Jan. 13, 1913
Davis, Willis A. and Davis, Ollie B.	Portion of SW. ¼ NE. ¼ and NW. ¼ NW. ¼ sec. 27, T. 15 S., R. 96 W., 6th P. M., containing 1.65 acres.	1.00	Apr. 4, 1913
Denning, Laura, and others...	Right to construct and maintain a pipe line across lots 1, 2, 3, 4, 5 and 24 of block 18 of Willerups subdivision to the town of Montrose, Colo.	50.00	Apr. 5, 1912
Dillon, Syrena E., and Palmer, Charles A.	Portion of SW. ¼ SE. ¼ sec. 11, T. 48 N., R. 10 W., N. M. P. M., containing 3.8 acres.	200.00	Dec. 6, 1912
Donley, Fred.....	Portion of N. ½ NE. ¼ sec. 9, T. 48 N., R. 10 W., N. M. P. M., containing 3.52 acres.	200.00	Feb. 1, 1913
Fenlon, Lizzie C.....	Portion of NW. ¼ NE. ¼ sec. 35, T. 48 N., R. 9 W., N. M. P. M., containing 1.33 acres.	75.00	May 7, 1912
Gallagher, Hugh.....	Portion of SE. ¼ SW. ¼, SW. ¼ SW. ¼ and NW. ¼ SW. ¼, sec. 27, T. 15 S., R. 96 W., 6th P. M., containing 2.58 acres.	50.00	Mar. 13, 1913
Gish, George F., and others ..	Lots 7 and 8 block 1, lots 7, 8, 17, and 18 of blocks 2, 3, and 4, and part of residence tract (unnumbered lot), all in Sunset subdivision to the town of Olathe, Colo.	350.00	May 14, 1913
Hampton, Charley W., and Hampton, Middleton W.	Portion of SE. ¼ NW. ¼ sec. 12, T. 48 N., R. 10 W., N. M. P. M., containing 0.56 acre.	1.00	Aug. 12, 1912
Jacobi, Hugo.....	SW. ¼ SW. ¼ sec. 22, T. 15 S., R. 96 W., 6th P. M., containing 0.76 acre.	1.00	Mar. 31, 1913
Kirks, Marinda T.....	Lots 8 and 9, block 7 of W. S. Gaines's subdivision to town of Olathe, Colo.	375.00	Mar. 7, 1913
Lovell, Jesse B.....	Portion of NW. ¼ NE. ¼ sec. 29, T. 50 N., R. 9 W., N. M. P. M., containing 0.68 acre.	34.00	Apr. 7, 1913
Miller, Freda.....	Right of way for telephone line across NE. ¼ SE. ¼ sec. 19, and NW. ¼ SW. ¼ sec. 20, T. 49 N., R. 7 W., N. M. P. M.	1.00	Dec. 9, 1912
Mowry, Lyman T., and Walters, Aaron.	Irrigation canal known as Mowry lateral in secs. 17, 18, and 20, T. 49 N., R. 8 W., N. M. P. M., and secs. 12 and 13, T. 49 N., R. 9 W., N. M. P. M.	1.00	Do.
Neale, Albert A., and Galloway, L. W.	Portion of NW. ¼ NW. ¼ sec. 10, containing 1.63 acres; portion of SW. ¼ SW. ¼ sec. 4, containing 2.3 acres; portion of lot 8 sec. 6, containing 0.93 acre; portion of lot 8 sec. 6, containing 0.13 acre; portion of lot 2 sec. 6, containing 2 acres. All in T. 48 N., R. 10 W., N. M. P. M.	1.00	July 3, 1912
O'Driscoll, William F.....	Portion of SW. ¼ NE. ¼ sec. 10, T. 48 N., R. 10 W., N. M. P. M., containing 0.89 acre; portion of NE. ¼ NW. ¼ sec. 10, T. 48 N., R. 10 W., N. M. P. M., containing 1.61 acres.	145.00	Jan. 30, 1913
Pepper, I. N., and Pepper, Emma R.	Portion of SW. ¼ SE. ¼ sec. 8, T. 49 N., R. 10 W., N. M. P. M., containing 0.52 acre.	75.00	Jan. 10, 1913
Perkins, H. E.....	Portion of W. ½ SE. ¼ sec. 3, containing 2.9 acres; portion of NE. ¼ SE. ¼ sec. 3, containing 0.2 acre. All in T. 50 N., R. 10 W., N. M. P. M.	1.00	Sept. 2, 1912
Richards, Adams, A. F. Mrs., and Richards, John D.	Lots 3, 4, 21, and 22, block 212; lots 3, 4, 21, and 22, block 207; and part of lots 22, 23, and 24, block 215, of the Alma Heights subdivision to the town of Olathe, Colo.	1.00	Nov. 29, 1912
Rollins, Frederick C., and Deeble, John.	Portion of S. ½ SW. ¼ SE. ¼ sec. 15, T. 49 N., R. 10 W., N. M. P. M., containing 0.86 acre more or less.	100.00	June 13, 1913
Suttle, Calahill E., and wife..	Portion of NW. ¼ NW. ¼ sec. 1, SE. ¼ NE. ¼ and NE. ¼ NE. ¼ sec. 2, T. 50 N., R. 10 W., N. M. P. M., containing 6.4 acres.	500.00	Nov. 14, 1912
Tagg, George A.....	Portion of NE. ¼ SE. ¼, N. ½ NW. ¼ SE. ¼, and N. ½ NE. ¼ SW. ¼ sec. 36, T. 48 N., R. 9 W., N. M. P. M., containing 3.15 acres.	225.00	Apr. 15, 1912
White, A. J., and others.....	Part NE. ¼ SW. ¼ sec. 10, T. 50 N., R. 10 W., N. M. P. M., containing 1⅝⅝ acres.	350.00	May 14, 1913

Purchases of rights and property—Continued.

IDAHO, BOISE PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Bedal, Wm., and wife	Easement across SE. ¼ SE. ¼ sec. 20, T. 3 N., R. 4 E.; E. ½ NW. ¼ and E. ½ SW. ¼ sec. 19.	$100.00	Sept. 3, 1912
Bores, Jam	Portion of T. 3 N., R. 5 E., B. M.	1,000.00	Apr. 2, 1913
Braden, Wm., and wife	Easement across SE. ¼ NW. ¼ and NE. ¼ SW. ¼ sec. 15.	100.00	June 29, 1912
Glorieux, A. J	T. 2 N., R. 2 W., B. M.; portion of lot 1, sec. 4, T. 2 N., R. 3 E., B. M.	100.00	June 15, 1912
Idaho, State of	NE. ¼ SW. ¼ sec. 5, T. 4 N., R. 5 W., B. M.; portion NE., ¼ SE. ¼ sec. 16, T. 2 N., R. 2 W., B. M.	620.00	Dec. 19, 1912
Leonardson, R. D	Easement across N. ½ NE. ¼ sec. 30 and SW. ¼ SW. ¼ sec. 20, T. 3 N., R. 4 E., B. M.	50.00	Dec. 27, 1912
Ross, F. P	Placer location in sec. 21, T. 3 N., R. 4 E., B. M.	250.00	Oct. 7, 1912
Town, Mary E	Part W. ½ NE. ¼ NE. ¼ SW., ¼ sec. 36, T. 21 S., R. 46 E., W. M.	75.00	Apr. 19, 1913

IDAHO, MINIDOKA PROJECT.

Daley, Chas. M. L	Part W. ½ SE. ¼ sec. 35, T. 9 S., R. 22 E., B. M., 0.6 acre.	$60.00	Dec. 2, 1912
Scott, Sewell F	Lots 1 and 2, block 139, townsite of Burley, Idaho.	700.00	Nov. 5, 1912

MONTANA, FLATHEAD PROJECT.

Bell, Francis Edward	Improvements on allotment 930, sec. 21, T. 22 N., R. 20 W., M. P. M.	$457.60	Dec. 14, 1912
Finley, Frank	A tract of land lying in sec. 29, T. 22 N., R. 20 W., M. P. M., 120 acres.	200.00	Dec. 11, 1911

MONTANA, HUNTLEY PROJECT.

Boudrye, Sam R., and wife	Damages to improvements on right of way for drain, farm unit A, sec. 36, T. 3 N., R. 28 E., M. P. M.	$1.00	Mar. 25, 1913
Bright, Edward S	Damages to improvements on right of way for drain, farm unit D, sec. 35, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 27, 1913
Brocksmith, W. F., and wife	Damages to improvements on right of way for drain, farm unit H, secs. 12 and 13, T. 2 N., R. 28 E., M. P. M.	1.00	June 3, 1913
Buckingham, Roy W	Damages to improvements on right of way for drain, farm unit L, sec. 35, T. 3 N., R. 28 E., M. P. M.	1.00	Mar. 29, 1913
Davis, Andrew H	Damages to improvements on right of way for drain, farm unit C, sec. 35, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 27, 1913
Davis, Glen	Damages to improvements on right of way for drain, farm unit E, sec. 35, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 26, 1913
Hargrove, Julius S	Damages to improvements on right of way for drain, farm unit J, sec. 35, T. 3 N., R. 28 E., M. P. M.	1.00	Mar. 25, 1913
Hansen, Mads, and wife	Damages to improvements on right of way for drain, farm unit F, sec. 5, T. 2 N., R. 30 E., M. P. M.	1.00	Apr. 1, 1913
Haw, James G	Damages to improvements on right of way for drain, farm unit K, sec. 35, T. 3 N., R. 28 E., M. P. M.	1.00	Mar. 25, 1913
Hebner, Chas. H., and wife	Damages to improvements on right of way for drain, farm unit L, sec. 1, T. 2 N., R. 28 E., M. P. M.	1.00	Mar. 25, 1913
Hebner, H. Lee, and wife	Damages to improvements on right of way for drain, farm unit G, secs. 12 and 13, T. 2 N., R. 28 E., M. P. M.	1.00	June 4, 1913
Hoff, Albert G., and wife	Damages to improvements on right of way for drain, farm unit O, sec. 34, T. 3 N., R. 28 E., M. P. M.	1.00	Mar. 25, 1913
Hottiger, Emil, and wife	Damages to improvements on right of way for drain, farm unit I, sec. 1, T. 2 N., R. 28 E., M. P. M	1.00	Do.

Purchases of rights and property—Continued.

MONTANA, HUNTLEY PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Hoveland, Andrew	Damages to improvements on right of way for drain, farm unit N, sec. 34, T. 3 N., R. 38 E., M. P. M.	$1.00	Mar. 25, 1913
Kauz, Henry, and wife	Damages to improvements on right of way for drain, farm unit B, sec. 36, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 27, 1913
Krause, Henry	Damages to improvements on right of way for drain, farm unit I, sec. 35, T. 3 N., R. 28 E., M. P. M.	1.00	Mar. 25, 1913
Lyons, Wm. F., and wife	Damages to improvements on right of way for drain, farm unit E, sec. 6, T. 2 N., R. 29 E., M. P. M.	1.00	Mar. 26, 1913
Nave, John	Damages to improvements on right of way for drain, farm unit B, sec. 35, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 27, 1913
Nelson, Andrew J., and wife	Damages to improvements on right of way for drain, farm unit C, sec. 5, T. 2 N., R. 30 E., M. P. M.	1.00	Mar. 26, 1913
Penner, Joshua A	Damagto es improvements on right of way for drain farm unit C, sec. 36, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 29, 1913
Porter, Frank H., and wife	Damages to improvements on right of way for drain farm unit K, sec. 1, T. 2 N., R. 28 E., M. P. M.	1.00	Mar. 26, 1913
Rossell, Hugh H., and wife	Damages to improvements on right of way for drain farm unit E, sec. 5, T. 2 N., R. 30 E., M. P. M.	1.00	Mar. 25, 1913
Rudio, Philipp, and wife	Damages to improvements on right of way for drain farm unit I, sec. 34, T. 3 N., R. 28 E., M. P. M.	1.00	Do.
Simon, Bruner H., and wife	Damages to improvements on right of way for drain farm unit T, sec. 36, T. 3 N., R. 28 E., M. P. M.	1.00	Do.
Vogel, Henry, and wife	Damages to improvements on right of way for drain farm unit D, sec. 36, T. 3 N., R. 29 E., M. P. M.	1.00	Mar. 27, 1913
Waller, Ida M	Damages to improvements on right of way for drain farm unit E, sec. 36, T. 3 N., R. 28 E., M. P. M.	1.00	Mar. 25, 1913
White, La Monte, and wife	Damages to improvements on right of way for drain farm unit H, sec. 1, T. 2 N., R. 28 E., M. P. M.	1.00	Mar. 26, 1913

MONTANA, MILK RIVER PROJECT.

Adams, George H., and wife	Part of NE. ¼ SE. ¼ and lots 10, 11, and 12, sec. 3, T. 30 N., R. 36 E., 118.98 acres.	$2,282.80	Jan. 23, 1913
Baalke, Herman W., and wife	Flowage easement, S. ½ NE. ¼, lots 1 and 7, sec. 33, T. 31 N., R. 36 E.	598.38	Aug. 9, 1912
Do	Flowage easement, S. ½ SE. ¼ sec. 28, N. ½ NE. ¼ sec. 33, T. 31 N., R. 36 E.	644.26	Do.
Baalke, Mary D., and husband.	Flowage easement, S. ½ SW. ¼ sec. 28, N. ½ NW. ¼ sec. 33, T. 31 N., R. 36 E.	424.34	Do.
Busch, Henreich	Flowage easement, N. ½ NW. ¼ sec. 28, T. 31 N., R. 36 E.	1.00	Nov. 18, 1912
Great Northern Railway Co	Part sec. 16, T. 30 N., R. 30 E., M. P. M., 2.22 acres.	346.50	Sept. 11, 1912
Harden, Oscar E	Flowage easement, SE. ¼ NE. ¼, NE. ¼ SE. ¼, and lots 10, 11, and 15, sec. 29, T. 31 N., R. 36 E.	88.00	Dec. 19, 1912
Hardin, Richard D	Flowage easement, S. ½ SE. ¼ sec. 29, T. 31 N., R. 36 E.	1.00	Aug. 12, 1912
Hellstern, Frederick G., and wife.	Part of NW. ¼ SE. ¼, SE. ¼ NW. ¼, and lot 6, sec. 2, T. 30 N.. R. 36 E., 94.34 acres.	3,773.60	May 15, 191
Henry, Burton G	SW. ¼ NE. ¼, lot 6, sec. 1, and lots 2, 7, 8, 9, sec. 12, T. 30 N., R. 36 E.	1,800.00	Feb. 13, 1913
Johnson, Jurgen	Flowage easement, S. ½ SW. ¼ sec. 20, T. 31 N., R. 36 E.	1.00	Nov. 18, 1912
Kent, Horatio N	Flowage easement, SW. ¼ NE. ¼, NE. ¼ SW. ¼ sec. 4, T. 30 N., R. 36 E.	1.00	Do.
Kent, Samuel J., and wife	Flowage easement, SW. ¼ SE. ¼, SE. ¼ SW. ¼, and lots 3, 5, 6, sec. 33, T. 31 N., R. 36 E.	254.00	Jan. 11, 1913
Kent, Samuel J., and Horatio N.	Flowage easement, N. ½ NE. ¼ sec. 5, T. 30 N., R. 36 E.	116.00	Nov. 16, 1912

Purchases of rights and property—Continued.

MONTANA, MILK RIVER PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
McManus, James, and wife...	Flowage easement, SW. ¼ SW. ¼, and lots 6 and 9, sec. 3, NE. ¼ SE. ¼, and lot 6, sec. 4, T. 30 N., R. 36 E.	$581.80	Aug. 9, 1912
Martin, George E.....	Flowage easement, S. ½ SE. ¼, sec. 20, and lot 1 and NE. ¼ NE. ¼ sec. 29, T. 31 N., R. 36 E.	1.00	Nov. 16, 1912
Montana, State of.....	S. ½ sec. 16, T. 31 N., R. 26 E., 37.5 acres.....	375.00	Dec. 31, 1912
Do.....	NW. ¼ SE. ¼ sec. 13, T. 31 N., R. 31 E., 40 acres.	400.00	Do.
Nelson, H. H., and wife.....	Lot 3, sec. 7, T. 30 N., R. 37 E.....	90.80	Mar. 27, 1913
Rothman, Gustav.....	Release lots 3, 7, 8, 9, 12, sec. 29, T. 31 N., R. 36 E.	1.00	June 25, 1912
Seeley, Lewis H., and wife...	Flowage easement, lots 2, 4, and 6, sec. 29, and lot 6, sec. 30, T. 31 N., R. 36 E.	1.00	Aug. 12, 1912
Shoemaker, Wm. B., and wife.	Right of way for flowage purposes, Vandalia Dam, over the SE. ¼ SE. ¼ and W. ½ SE. ¼, sec. 4, and NW. ¼, NE. ¼ sec. 9, T. 30 N., R. 36 E., M. P. M.	1.00	Mar. 27, 1912
Turner, Loring A., and Levi Cox and wife.	Flowage easement, N. ½ NE. ¼, and lots 1 and 4, sec. 32, T. 31 N., R. 36 E.	750.00	Nov. 16, 1912
Welton, Michael J., and wife..	Flowage easement, SE. ¼ SW. ¼, lot 3; sec. 34, lot 13, sec. 33, T. 31 N., R. 36 E.; lots 3 and 4, sec. 3; and lot 1, sec. 4, T. 30 N., R. 36 E.	206.26	Aug. 9, 1912

MONTANA, SUN RIVER PROJECT.

Floweree Sheep & Horse Co..	Tract of land containing 7.49 acres in sec. 9, T. 21 N., R. 4 W.; 0.88 acre in sec. 4, T. 21 N., R. 4 W.; 7.91 acres in sec. 4, T. 21 N., R. 4 W., M. P. M.	$422.00	Jan. 18, 1913
Henningsen Land Co.....	Tract of land containing 348.09 acres, as follows: S. ½ NW. ¼ sec. 2, SE. ¼ NE. ¼, NE. ¼ of SE. ¼, S. ½ SW. ¼ sec. 3, and N. ½ NW. ¼ sec. 10, T. 22 N., R. 7 W.; 11.73 acres in sec. 9, T. 22 N., R. 7 W.; 5.58 acres in sec. 24, T. 22 N., R. 7 W.; 3.12 acres in sec. 31, T. 22 N., R. 6 W.; 7.66 acres in sec. 4, T. 21 N., R. 6 W., M. P. M.	4,282.74	Feb. 18, 1913
State of Montana.....	Right of way across N. ½ NE. ¼ sec. 28, T. 22 N., R. 8 W., M. P. M., 11.32 acres.	1.00	Jan. 13, 1913
Do.....	0.88 acre in SE. ¼ NW. ¼ sec. 5, and 7.63 acres in SE. ¼ NE. ¼ sec. 5, T. 21 N., R. 6 W., M. P. M.	1.00	Mar. 13, 1913
Do.....	4.1 acres in E. ½ NW. ¼ sec. 4, and 6.1 acres in NE. ¼ SW. ¼ sec. 4, T. 21 N., R. 6 W., M. P. M.	1.00	Do.
Do.....	11.99 acres in S. ½ SE. ¼ sec. 4, T. 21 N., R. 6 W., M. P. M.	1.00	Do.
Do.....	1.76 acres in NE. ¼ NE. ¼ sec. 16, T. 21 N., R. 5 W., M. P. M.	1.00	Do.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Alling, Ira M., and wife.....	Right of way for drain, SE. ¼ sec. 36, T. 24 N., R. 59 E., M. P. M.	$1.00	May 26, 1913
Anderson, Anders P., and wife.	Right of way for drain, S. ½ NE. ¼ sec. 21, T. 23 N., R. 59 E., M. P. M.	1.00	May 27, 1913
Anderson, Bertha, and husband.	Right of way for drain, N. ½ SE. ¼ sec. 21, T. 23 N., R. 59 E., M. P. M.	1.00	May 23, 1913
Anderson, Peter M., and wife.	Right of way for drain, SE. ¼ sec. 29, T. 23 N., R. 59 E., M. P. M.	1.00	May 24, 1913
Beulieu, Joseph.....	Damages to improvements on right of way for drain N. ½ NW. ¼ sec. 1, T. 23 N., R. 59 E., M. P. M.	1.00	May 23, 1913
Bruegger, John, and wife.....	A tract of land in sec. 23, T. 23 N., R. 59 E., M. P. M., 9.3 acres.	232.50	Nov. 22, 1912
Cheney, W. H.....	Right of way for drain, SE. ¼ SE. ¼ sec. 10, T. 23 N., R. 59 E., M. P. M.	1.00	May 23, 1913
Consler, Baldwin, and wife...	Damages to improvements on right of way for drain, SE. ¼ sec. 2, T. 23 N., R. 59 E., M. P. M.	1.00	May 26, 1913

Purchases of rights and property—Continued.

NEVADA, TRUCKEE-CARSON PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Central Pacific Railway Co. and Southern Pacific Co.	Easement to flood a portion of E. ½ NE. ¼ sec. 24, T. 20 N., R. 22 E., M. D. B. and M.	$10.00	Apr. 16, 1913
Denning, Clarence E., and wife.	Right of way across portions of secs. 35 and 36, T. 19 N., R. 28 E., M. D. B. and M. for "L" line canal.	200.00	May 20, 1907
Folsom, Lewis D., and wife, and Fulton, R. L., and wife.	Right of way across S. ½ NE. ¼ sec. 20, T. 20 N., R. 23 E., M. D. B. and M., for Truckee Canal.	1.00	July 22, 1912
Inman, Frank W., and wife..	Water power right in connection with flour mill in NW. ¼ NE. ¼ sec. 30, T. 18 N., R. 29 E., M. D. B. and M., 40 cubic feet per second.	7,500.00	June 4, 1913
Johnson, C. F. & W. R.....	Right of way over SW. ¼ NW. ¼ sec. 34, T. 19 N., R. 28 E., M. D. B. and M., for "L" line canal.	200.00	Nov. 30, 1912
Kallenbach, G. C., and wife..	Right of way over portion of SE. ¼ sec. 17, T. 19 N., R. 29 E., M. D. B. and M., for "Lc" drain and "C3" drain.	1.00	Apr. 3, 1913
Ordway, H. E., and wife and Washburn, Dan.	Right of way over SW. ¼ NE. ¼ sec. 22, T. 20 N., R. 23 E., M. D. B. and M. for Truckee Canal.	1.00	Dec. 2, 1912
Smart, S. B.....	Right of way across S. ½ sec. 7, T. 18 N., R. 29 E., M. D. B. and M., for "C2x" drain.	100.00	(1)
Southern Pacific Co.....	Right of way across N. ½ SE. ¼ sec. 19, T. 20 N., R. 23 E., M. D. B. and M., for Truckee Canal.	1.00	Apr. 16, 1913
Wheeler, Willard Park, and wife.	Right of way across SE. ¼ NW. ¼ SW. ¼ NE. ¼, and NE. ¼ SE. ¼, sec. 21, T. 20 N., R. 23 E., M. D. B. and M., for Truckee Canal.	1.00	July 6, 1912

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

Apodaca, Emiliano, and wife..	Part of the village of Contadero, in Pedro Armendaris grant No. 33, 4.03 acres.	$60.45	Nov. 15, 1912
Chavez, Pio, and wife.....	Part of village of Canta Recio, 13.36 acres.....	200.40	July 25, 1912
Gonzales, Jose Perfecto.....	Area near the village of Alamosita, 95.47 acres...	727.45	Jan. 24, 1913
Rouiller, August E., and wife.	Part of village of Canta Recio, 47.49 acres, with improvements consisting of 21 houses.	4,262.45	Oct. 10, 1912
Serna, Maurisio.....	Part of village of Cantadero in Pedro Armendaris grant No. 33, 5 acres.	125.25	Nov. 19, 1912
Velarde, Ramona Trujillo, de.	Part of village of Cantadero, in Pedro Armendaris grant No. 33, 42.48 acres.	536.00	Apr. 5, 1913

OREGON, UMATILLA PROJECT.

Koontz, Cynthia A.....	Part NE. ¼ NW. ¼, W. ½ NE. ¼, SE. ¼ NE. ¼ sec. 16, T. 3. N., R. 29 E., W. M., 4.61 acres.	$115.25	Aug. 2, 1912
Newport, H. Ross.....	Purchase of improvements on strip in E. ½ NE. ¼ and N. ½ SE. ¼ sec. 12, T. 4 N., R. 28 E., W. M.	78.00	Jan. 16, 1913

OREGON-CALIFORNIA, KLAMATH PROJECT.

Adams, J. Frank, and wife...	Part N. ½ SE. ¼ and lot 5 of sec. 7, T. 41 S., R. 11 E., W. M.	$1.00	Nov. 18, 1912
Addison, A. D., and wife.....	Part W. ½ NW. ¼ sec. 6, T. 40 S., R. 10 E., W. M.	1.00	Aug. 27, 1912
American Bank & Trust Co.	Part N. ½ SE. ¼ sec. 26, T. 39 S., R. 9 E. W. M..	1.00	Aug. 28, 1912
Ankeny, Cordelia L.....	Part NW. ¼ SW. ¼ sec. 12, T. 39 S., R., 9 E., W. M.	1.00	Nov. 11, 1912
Anderson, Mary J., and husband.	Part SW. ¼ SW. ¼, sec. 28, T. 39 S., R. 9 E., W. M.	1.00	July 12, 1912
Anderson, Otto F.....	Part SW. ¼ NW. ¼ sec. 32, T. 39 S., R. 9 E., W. M.	1.00	Dec. 11, 1912
Baxa, John.....	Part SE. ¼ SW. ¼ sec. 32, T. 39 S., R. 9 E., W. M.	1.00	July 12, 1912
Beardsley, J. O., and wife...	Part SW. ¼ NE. ¼, SE. ¼ NW. ¼ sec. 27, T. 39 S., R. 9 E., W. M.	1.00	July 20, 1912
Best, J. A., and wife.....	Part NE. ¼ NE. ¼ and lot 6 of sec. 7, lot 5 of sec. 8, T. 40 S., R. 10 E., W. M.	1.00	May 26, 1913
Bour, Geneva M., and husband.	Part lot 9, sec. 22, T. 39 S., R. 10 E., W. M.....	40.00	June 27, 1912
Bradbury, Clement, and wife.	Part lot 6; S. ½ SE. ¼ sec. 29, lot 1, sec. 32, T. 39 S., R. 10 E., W. M.	200.00	July 8, 1912
Brandenburg & Fountain.....	Part NE. ¼ NE. ¼ sec. 13, T. 39 S., R. 10 E., W. M.	1.00	Apr. 22, 1913
Bru, Ernest.....	Part lots 8, 9, 10, and 11, sec. 14, and lot 6, sec. 13, T. 39 S., R. 10 E., W. M.	400.00	Sept. 25, 1912

[1] Decree and judgment Nov. 26, 1912.

Purchases of rights and property—Continued.

OREGON-CALIFORNIA, KLAMATH PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Campbell, E. B., et al	Part SE. ¼ NE. ¼ and lot 1, sec. 36, T. 39 S., R. 8 E., W. M., and NE. ¼ NE. ¼ sec. 30, T. 39 S., R. 9 E., W. M.	$1.00	Nov. 9, 1912
Cheyne, Robert, and wife	Part SW. ¼ SW. ¼ sec. 7, T. 40 S., R. 10 E., W. M.	1.00	June 23, 1913
Corpening, F. P., and wife	Part lots 4 and 6, sec. 14, T. 39 S., R. 10 E., W. M.	1.00	June 27, 1912
Cramer, R. M., and wife	Part SE. ¼ SW. ¼ sec. 34, T. 39 S., R. 11½ E., W. M.	1.00	Apr. 30, 1913
Eastwood, Simeon C	Part lots 8 and 9, sec. 17, T. 40 S., R. 10 E., W. M.	65.00	July 1, 1912
Enterprise Land & Investment Co.	Part SE. ¼ NE. ¼ sec. 33, T. 38 S., R. 9 E., W. M.	1.00	Sept. 28, 1912
Do	Part tract No. 40, Enterprise tracts	1.00	Do.
Evans, Vivian R	Part lots 7 and 10, sec. 4, T. 40 S., R. 11 E., W. M.	60.00	Aug. 30, 1912
Fischer, John	Part lots 3 and 4, sec. 3, T. 40 S., R. 11 E., W. M.	1.00	Mar. 24, 1913
French, Grace G., and husband.	Part SE. ¼ SE. ¼ and lot 2, sec. 19, T. 39 S., R. 9 E., W. M.	1.00	Nov. 9, 1912
Gardner, Emma K., and husband.	Part lots 19 and 20 and NW. ¼ SW. ¼ sec. 2, T. 40 S., R. 11 E., W. M.	85.00	Sept. 12, 1912
Do	Part lot 20, sec. 2, T. 40 S., R. 11 E., W. M.	1.00	Feb. 19, 1913
Glenn, Ophelia, and husband.	Part lot 3, sec. 8, and lot 10, sec. 17, T. 40 S., R. 10 E., W. M.	65.00	June 24, 1912
Grennon, Fred U., and wife	Part S. ½ SE. ¼ sec. 26, T. 39 S., R. 9 E., W. M.	1.00	Aug. 18, 1912
Griffith, Stephen H., and wife.	Part NE. ¼ NE. ¼ sec. 32, T. 39 S., R. 11½ E., NE. ¼ NE. ¼ sec. 6, T. 40 S., R. 10 E., W. M.	80.00	Aug. 29, 1912
Grffith, Stephen H	Part S. ½ NW. ¼, S. ½ SW. ¼, sec. 28, T. 39 S., R. 11½ E., W. M.	1.00	May 15, 1913
Harris, W. D., and wife	Part S. ½ SW. ¼ and NW. ¼ SW. ¼ sec. 27, T. 39 S., R. 9 E., W. M.	1.00	Oct. 23, 1912
Do	Part NW. ¼ SW. ¼, SW. ¼ SE. ¼, SE. ¼ SW. ¼ sec. 27, T. 39 S., R. 9 E., W. M.	267.00	Do.
Henry, E. B., and wife	Part SW. ¼ NE. ¼ sec. 22, T. 39 S., R. 9 E., W. M.	1.00	Sept. 27, 1912
Johns, Albert, and wife	Part SW. ¼ SW. ¼, SE. ¼ SW. ¼ sec. 14, and NE. ¼ NW. ¼ sec. 23, T. 39 S., R. 9 E., W. M.	1.00	May 5, 1913
Klamath County	Part SE. ¼ NE. ¼ sec. 15, T. 39 S., R. 9 E., W. M.	1.00	Do.
Krizo, Frank, and wife	N. ½ SE. ¼ SE. ¼ sec. 10, T. 41 S., R. 11 E., W. M.	1.00	May 2, 1913
McLain, Glen G	Part N. ½ SW. ¼ sec. 32, T. 39 S., R. 9 E., W. M.	1.00	Dec. 11, 1912
Maddox, J. A	Part lot 4, sec. 21; S. ½ SW. ¼, sec. 22; NE. ¼ NW. ¼ and SW. ¼ NE. ¼, sec. 27, T. 40 S., R. 10 E., W. M.	100.00	July 20, 1912
Do	Part SW. ¼ SW. ¼, sec. 22; lot 4, sec. 21; lot 4, sec. 28; NW. ¼ NW. ¼ and lots 8 and 9, sec. 27, T. 40 S., R. 10 E., W. M.	1.00	May 17, 1913
Mark, Albert	Part W. ½ lot 3 and lot 4, sec. 4, T. 40 S., R. 11 E., W. M.	40.00	Sept. 24, 1912
Do	Part NW. ¼ NW. ¼ sec. 34, T. 39 S., R. 11½ E., W. M.	1.00	May 15, 1913
Mark, Mary	Part lot 2 and E. ½ lot 3, sec. 4, T. 40 S., R. 11 E.	40.00	July 2, 1912
Masten, W. W., and wife	Part SE. ¼ SW. ¼, sec. 22; E. ½ NW. ¼, S. ½ NE. ¼, and N. ½ SE. ¼, sec. 27; SW. ¼ NW. ¼, NW. ¼ SW. ¼, sec. 26, T. 39 S., R. 11½ E., W. M.	1.00	Oct. 28, 1911
Mason, Burge W., and wife	Part NW. ¼ SW. ¼, SW. ¼ NW. ¼ sec. 22, T. 39 S., R. 9 E., W. M.	1.00	Aug. 8, 1912
Melhase, Fred, and others	Part SW. ¼ SW. ¼ sec. 30, T. 39 S., R. 10 E., W. M.	1.00	Nov. 9, 1912
Mendenhall, Bertha L., and husband.	Part lot 1, sec. 2, T. 40 S., R. 11 E., W. M.	1.00	Mar. 22, 1913
Miller, I. D	Part lot 12, sec. 20; SW. ¼ SE. ¼; SE. ¼ SW. ¼, sec. 17, T. 39 S., R. 9 E., W. M.	1.00	Sept. 12, 1912
Miller, Oliver M., and wife	Part W. ½ NE. ¼ and NE. ¼ NW. ¼ sec. 28, T. 39 S., R. 9 E., W. M.	1.00	Apr. 15, 1913
Moore, C. S. & R. S	Canal system, water rights and right of way across lot 4, sec. 30, T. 38 S., R. 9 E., W. M., and lots 4 and 5, sec. 30, and lots 1 and 2, sec. 31, T. 38 S., R. 9 E., W. M.	(1)	Nov. 20, 1912
Moore, Chas. S., and wife	Part SW. ¼ SW. ¼; NE. ¼ SW. ¼; SE. ¼ NW. ¼ sec. 26; SE. ¼ SE. ¼ sec. 27, T. 39 S., R. 9 E., W. M.	1.00	July 29, 1912
Moore, E. L. & E. H	Part lots 15, 17, and 18 sec. 3, T. 40 S., R. 11 E., W. M.	40.00	July 2, 1912
Moorland, A. S., and wife	Part lot 8, sec. 20, T. 39 S., R. 10 E., W. M.	1.00	July 17, 1912
Nylander, Hans, and wife	Part SW. ¼ NE. ¼; NW. ¼ SE. ¼, sec. 8, T. 40 S., R. 10 E., W. M.	50.00	July 1, 1912
Do	Part SE. ¼ NW. ¼. and lot 4 sec. 8, T. 40 S., R. 10 E., W. M.	1.00	Dec. 23, 1912

[1] Perpetual right to 205 second-feet of water from Keno Canal.

Purchases of rights and property—Continued.

OREGON-CALIFORNIA, KLAMATH PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Olene Live Stock Co	Part S. ½ NE. ¼, E. ½ SE. ¼ sec. 11, SW. ¼ NW. ¼ and lot 1, sec. 12; lot 5, sec. 13, T. 39, S. R. 10 E., W. M.	$500.00	Dec. 20, 1912
Pfannstiehl, Louis, and wife	Part lot 12, sec. 35, T. 39 S., R. 11½ E., W. M., lots 2, 3, and 4, sec. 2, lots 8 and 9, sec. 3, T., 40 S., R. 11 E., W. M.	1.00	May 27, 1913
Roberts, Hiram H., and wife	Part E. ½ SW. ¼ sec. 33, T. 39 S., R. 11½ E., W.M.	55.00	July 2, 1912
Sargent, H. H., and wife	Part E½ NW. ¼ and W. ½ NE. ¼ sec. 12, T. 39 S., R. 10 E., W. M.	386.00	June 29, 1912
Short, J. B., and wife	Part lot 8, sec. 19, N. ½ NE. ¼ sec. 30; NW. ¼ NW. ¼ sec. 29, T. 39 S., R. 11½ E., W. M.	80.00	Aug. 29, 1912
Do	Part NE. ¼ sec. 33, T. 39 S., R. 11½ E., W. M.	1.00	May 15, 1913
Shulmire, Charles	Part NW. ¼ NW. ¼ sec. 28, T. 39 S., R. 9 E., W. M.	1.00	June 11, 1912
Smith, Joseph W	Part NW. ¼ SW. ¼ sec. 28, T. 39 S., R. 9 E., W. M.	1.00	Sept. 18, 1912
Steeman, Charles and wife	Part NE. ¼ NW. ¼ sec. 19, T. 40 S., R. 10 E., W. M.	100.00	July 16, 1912
Stewart, Tassey, and wife	Part lots 5 and 6, sec. 20, NW. ¼ NE. ¼ and E. ½ SE. ¼ sec. 29, T. 39 S., R. 11½ E., W. M.	100.00	Dec. 19, 912
Stokel, Joseph	Part E. ½ SE. ¼ sec. 32, T. 39 S., R. 9 E., W. M.	1.00	July 11, 1912
Taylor, Joseph C., and wife	Part SE. ¼ SE. ¼ sec. 13, T. 39 S., R. 10 E., W. M. and lots 9 and 10, sec. 19, T. 39 S., R. 11½ E., W. M.	40.00	Feb. 24, 1913
Tingley, W. L., and wife	Part W. ½ NW. ¼; N. ½ SW. ¼, W. ½ SE. ¼ sec. 33, T. 39 S., R. 9 E., W. M.	1.00	July 11, 1912
Tipton, H. C., and wife	Part SE. ¼ SE. ¼ sec. 12, T. 39 S., R. 10 E., W. M., and SE. ¼ sec. 18, T. 39 S., R. 11½ E., W. M.	75.00	July 2, 1912
Tipton, John M	Part SE. ¼ sec. 12, T. 39 S., R. 10 E., W. M., and W. ½ and SW. ¼ of SE. ¼ sec. 18, T. 39 S., R. 11½ E., W. M.	75.00	Do.
Van Meter, Etta, and husband	Part W. ½ SE. ¼, sec. 29, T. 39 S., R. 11½ E., W. M.	35.00	Aug. 16, 1912
Walton, G. L., and wife	Part lot 2, sec. 19, T. 39 S., R. 9 E., W. M.	1.00	Nov. 11, 1912
Watters and Crane	Part E. ½ SE. ¼ sec. 6, T. 40 S., R. 10 E., W. M.	1.00	Apr. 30, 1913
Webber, Maggie, and husband	Part NW. ¼ SW. ¼ sec. 33, T. 39 S., R. 11½ E., W. M.	40.00	Sept. 9, 1912
White, G. W., and wife	Part SE. ¼ SE. ¼ sec. 18, NE. ¼ NE. ¼ sec. 19, and NW. ¼ NW. ¼ sec. 20, T. 39 S., R. 11½ E., W. M.	100.00	July 22, 1912
Williams, J. L. Ferd	Part SW. ¼ SW. ¼ sec. 34, T. 39 S., R. 9 E., W. M.	1.00	July 9, 1912
Withrow, Bert E., and wife	Pnrt lots 6 and 7, sec. 17; lot 5, sec. 20; lots 8 and 11, sec. 21, T. 40 S., R. 10 E., W. M.	125.00	Jan. 14, 1913
Worden, Chas. E., and wife	Part lots 2 and 3, sec. 21; lot 1, sec. 28; lot 8 and NE. ¼ SE. ¼ sec. 20; SW. ¼ SW. ¼ sec. 34; lot 4, sec. 21; lot 3, sec. 28; lots 2, 3, 4, 9, and 10, sec. 21, T. 39 S., R. 9 E., W. M.	1.00	Feb. 3, 1913
Do	Part NW. ¼ SW. ¼ sec. 26, T. 39 S., R. 9 E., W. M.	1.00	Aug. 6, 1912
Do	Part SE. ¼ SE. ¼ sec. 33, SE. ¼ NE. ¼ and lots 6 and 12, sec. 20; SE. ¼ NW. ¼, NE. ¼ SW. ¼ and NW. ¼ SE. ¼, sec. 22, T. 39 S., R. 9 E., W. M.	1.00	Do.
Young, D. Ellis, and wife	Part NW. ¼ NE. ¼, NE. ¼ NW. ¼, sec. 33; S. ½ SW. ¼, sec. 28, T. 39 S., R. 10 E., W. M.	2 farm bridges.	May 24, 1913

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

Brandsberg, Christian	Easement for right of way through SE. ¼ of NW. ¼, sec. 2, T. 8 N., R. 3 E., B. H. M.	$1.00	Oct. 18, 1912
Kellum, Truman C., and wife	Easement for right of way through W. ½ NW. ¼ and W. ½ SW. ¼, sec. 29, T. 9 N., R. 4 E., B. H. M.	1.00	Dec. 18, 1912
Norman, Olaf, and wife	Easement for right of way through SE. ¼ NE. ¼ of sec. 17, T. 8 N., R. 6 E., B. H. M.	1.00	Nov. 2, 1912

WASHINGTON, YAKIMA PROJECT.

Allen, Ed. C., and wife, and Wright, O. C., and wife.	Defining right of way Sunnyside Canal through NW. ¼ sec. 34, T. 10 N., R. 23 E., W. M.	.....	Dec. 28, 1912
Austin Fruit Co	Defining right of way Snipes Mountain lateral across NE. ¼ SE. ¼ sec. 31, T. 10 N., R. 22 E., W. M.	.....	Aug. 13, 1912

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Baker, Clarence, and wife	Improvements on right of way Rocky Ford lateral, east half tract A, town of Grandview.	$100.00	Dec. 7, 1912
Barkwill, Ben, and wife	30-foot strip across lot 8 of Campbell's addition to Prosser.	1.00	July 24, 1912
Beek, Rick	Defining right of way south branch Snipes Mountain lateral over NW ¼ NW. ¼ sec. 2, T. 9 N., R. 22 E., W. M.	.....	July 12, 1912
Do	Defining right of way south branch Snipes Mountain lateral over SW. ¼ NW. ¼ sec. 2, T. 9 N., R. 22 E., W. M.	1.00	Do.
Benedict, Chas. N., and wife	Site for patrol house, Tieton Unit, in SW. ¼ SE. ¼ NE. ¼ sec. 18, T. 14 N., R. 17 E., W. M.	400.00	Apr. 15, 1912
Bone, Rufus H., and wife	150-foot strip establishing right of way Sunnyside Main Canal across N. ½ S. ½ and SW. ¼ NW. ¼ sec. 29, T. 9 N., R. 24 E., W. M.	1.00	Oct. 24, 1912
Bragdon, Louise S	An irregular tract in NE. ¼ NE. ¼ sec. 21, T. 9 N., R. 23 E., W. M.	100.00	Aug. 7, 1912
Bridgman, Hattie R., and husband, and Otto Dekker and wife.	Right of way Snipes Mountain lateral across SE. ¼ SE. ¼ sec. 34, T. 10 N., R. 22 E., W. M.	1.00	July 27, 1912
Bridgman, Hattie R., and husband.	Right of way for Snipes Mountain lateral over S. ½ SE. ¼ sec. 34, T. 10 N., R. 22 E., W. M.	1.00	July 25, 1912
Cresci, Peter	Improvements on right of way, lateral 44.57a, sec. 10, T. 9 N., R. 23 E., W. M.	47.50	Nov. 14, 1912
Dean, Elza, and wife	Right of way, Ryder lateral, in block F, Grandview.	188.00	Dec. 4, 1912
Dekker, Otto, and wife	Defining right of way south branch Snipes Mountain lateral over SW. ¼ NW. ¼ sec. 2, T. 9 N., R. 22 E., W. M.	1.00	July 12, 1912
Dunn, Cassius M	Improvements on right of way, sec. 24, T. 9 N., R. 22 E., W. M.	30.00	Oct. 3, 1912
Dunn, Harvey, and wife	Additional right of way Sunnyside Main Canal ⅜ acres in S. ½ SE. ¼ sec. 33, T. 11 N., R. 21 E., W. M.	450.00	Apr. 12, 1913
Fleming, W. S., and wife	Improvements on 50-foot strip across E. ½ NW. ¼ SE. ¼ sec. 31, T. 10 N., R. 22 E., W. M.	16.00	Aug. 13, 1912
Forsell, Jonas, and wife	Improvements along Ryder lateral over NE. ¼ NW. ¼ sec. 21, T. 9 N., R. 23 E., W. M.	152.00	July 3, 1912
Gillett, C. R., and wife	Improvements along Ryder lateral over W. ½ tract A of Grandview, sec. 23, T. 9 N., R. 23 E., W. M.	60.00	Mar. 11, 1913
Harne, Wm., and wife	Improvements along Snipes Mountain lateral over lot 1, block 5, Harrison's acre tracts, secs. 25 and 26, T. 10 N., R. 22 E., W. M.	35.00	July 25, 1912
Hardman, John	Defining old right of way of Sunnyside Main Canal through NE. ¼ NW. ¼ and NW. ¼ NE. ¼ sec. 30, T. 9 N., R. 24 E., W. M.	1.00	Oct. 24, 1912
Do	Defining right of way Sunnyside Main Canal through SE. ¼ NE. ¼ sec. 30, T. 9 N., R. 24 E., W. M.	1.00	Do.
Hardman, Myrtle Irene, and others.	Defining right of way Snipes Mountain lateral over lot 10, block A, Geo. E. Shaw's acre tracts, Sunnyside, sec. 25, T. 10 N., R. 22 E., W. M.	.....	Mar. 14, 1912
Harrison, W. H., and wife	Defining right of way Sunnyside Main Canal through NE. ¼ NW. ¼ sec. 34, T. 10 N., R. 23 E., W. M.	1.00	Oct. 15, 1912
Hedden, W. H., and wife	Improvements along Snipes Mountain lateral through lots 13 and 14, Lichty's subdivision, Sunnyside, sec. 25, T. 10 N., R. 22 E., W. M.	20.00	Mar. 30, 1912
Helme, James S	Defining right of way Sunnyside Main Canal through SW. ¼ sec. 34, T. 10 N., R. 23 E., W. M.	.....	Sept. 5, 1912
Herold, John C., and wife	Right of way Sunnyside Main Canal over S. ½ SW. ¼ and SW. ¼ SE. ¼ sec. 10, T. 10 N., R. 22 E., W. M.	1.00	Sept. 11, 1912
Hoagland, J. M	Defining right of way Sunnyside Main Canal through W. ½ SW. ¼ sec. 19, T. 9 N., R. 24 E., W. M.	1.00	Nov. 7, 1912
Do	Defining right of way Sunnyside Main Canal across NW. ¼ NW. ¼ sec. 30, T. 9 N., R. 24 E., W. M.	1.00	Do.
Hutchinson, Samuel, and wife.	Defining right of way Sunnyside Main Canal through SE. ¼ NE. ¼ sec. 33, T. 10 N., R. 23 E., W. M.	.....	July 29, 1912
Killian, Paul, and wife	Improvements along Ryder lateral over E. ½ SW. ¼ NE. ¼ sec. 20, T. 9 N., R. 23 E., W. M.	90.00	July 20, 1912

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Kuykendall, G. B., and wife	Additional right of way for pipe line through lot 14, block A, Shaw's acre tracts, Sunnyside.	$12.00	Aug. 1, 1912
Lowe, Arthur E., and wife	Improvements along Ryder lateral through NW. ¼ NE. ¼ sec. 22, T. 9 N., R. 23 E., W. M.	17.50	Mar. 13, 1913
Do	Defining right of way Ryder lateral in NE. ¼ NE. ¼ sec. 22, T. 9 N., R. 23 E., W. M.	1.00	Do.
Do	Additional right of way Ryder lateral, in N. ½ NE. ¼ sec. 22, T. 9 N., R. 23 E., W. M.	528.50	Aug. 29, 1912
Matthews, Grant	Improvements along Snipes Mountain lateral over SW. ¼ NW. ¼ sec. 31, T. 10 N., R. 22 E., W. M.	75.00	Aug. 15, 1912
Northern Pacific Ry. Co.	Defining right of way Snipes Mountain lateral across NW. ¼ NW. ¼ and SW. ¼ NE. ¼ sec. 31, T. 10 N., R. 22 E., W. M.	1.00	Aug. 30, 1912
Do	Defining right of way Sunnyside Main Canal across SE. ¼ NE. ¼ sec. 13, T. 10 N., R. 22 E., W. M.	1.00	Mar. 31, 1913
Do	Defining right of way Sunnyside Main Canal across SW. ¼ SE. ¼ sec. 17, T. 10 N., R. 23 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal across lots 2 and 3, S. ½ NE. ¼, SE. ¼ NW. ¼, NE. ¼ SW. ¼, NW. ¼ SE. ¼, NE. ¼ SE. ¼, in sec. 19, T. 9 N., R. 25 E., W. M.	1.00	Do.
Northwestern Improvement Co.	Purchase for gravel-pit purposes lot 1 frac. NE. ¼ NE. ¼ sec. 3, T. 20 N., R. 13 E., W. M.	1,911.80	Dec. 2, 1912
Pacific Power & Light Co	Defining right of way Prosser west lateral across NW. ¼ SE. ¼ SW. ¼ and SW. ¼ SE. ¼ SW. ¼ sec. 1, T. 8 N., R. 24 E., W. M.	.....	Aug. 13, 1912
Petty, May K., and husband	Additional right of way Snipes Mountain lateral across lots 1 and 10, block C, and lot 1, block D, Fairview addition, Sunnyside, sec. 25, T. 10 N., R. 22 E., W. M.	425.00	Sept. 21, 1912
Phoenix Investment Co	Improvements various laterals in SE. ¼ sec. 4, T. 12 N., R. 17 E., W. M.	300.00	July 29, 1912
Prosser Falls Land & Power Co.	Defining right of way lateral Sunnyside Main Canal through SE. ¼ SW. ¼ sec. 1, T. 8 N., R. 24 E., W. M.	.....	Feb. 14, 1911
Rowe, Anson, and wife	Purchase for gravel-pit purposes tract in SW. corner NW. ¼ SE. ¼ sec. 21, T. 10 N., R. 22 E., W. M.	150.00	Oct. 26, 1912
Sutter, H. W., and wife	Improvements along Sunnyside Main Canal in SW. ¼ SE. ¼ sec. 24, T. 11 N., R. 20 E., W. M.	45.00	Sept. 3, 1912
Waggoner, I. S., and wife	Improvements along Sunnyside Main Canal through SW. ¼ SW. ¼ sec. 2, T. 10 N., R. 21 E., W. M.	25.00	Aug. 26, 1912
Walker, Wesley J., and wife	Defining right of way Sunnyside Main Canal through NW. ¼ sec. 34, T. 10 N., R. 23 E., W. M.	.....	Sept. 9, 1912
Warner, E. J., and wife	Improvements along Snipes Mountain lateral through W. ½ NW. ¼ SE. ¼ sec. 31, T. 10 N., R. 22 E., W. M.	10.00	Aug. 14, 1912
Washington Irrigation Co	Defining right of way Snipes Mountain lateral through NE. ¼ SE. ¼ and NW. ¼ SE. ¼ sec. 31, T. 10 N., R. 22 E., W. M.	1.00	Oct. 19, 1912
Do	Defining right of way Ryder lateral through NW. ¼ sec. 20, T. 9 N., R. 23 E., W. M.	.....	Sept. 16, 1912
Do	Defining right of way Sunnyside Main Canal in sec. 27, T. 10 N., R. 23 E., W. M.	1.00	Oct. 19, 1912
Do	Defining right of way Sunnyside Main Canal through S. ½ N. ½ sec. 27, T. 9 N., R. 24 E., W. M.	1.00	Oct. 25, 1912
Do	Defining right of way south branch Snipes Mountain lateral through SW. ¼ and east branch Snipes Mountain lateral through SE. ¼ SW. ¼ SW. ¼ sec. 2, T. 9 N., R. 22 E., W. M.	1.00	Oct. 19, 1912
Do	Defining right of way Sunnyside Main Canal through NW. ¼ and NW. ¼ NE. ¼ sec. 25, T. 9 N., R. 24 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through S. ½ SE. ¼ sec. 3, T. 10 N., R. 21 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through sec. 9, T. 10 N., R. 22 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through NW. ¼ sec. 3, T. 9 N., R. 23 E., W. M.	1.00	Do.

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Considera-tion.	Date of deed.
Washington Irrigation Co	Defining right of way Sunnyside Main Canal through NW. ¼ and S. ½ NE. ¼ sec. 7, T. 10 N., R. 22 E., W. M.	$1.00	Oct. 19, 1912
Do	Defining right of way Sunnyside Main Canal through W. ½ NW. ¼ sec. 13, T. 10 N., R. 22 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through N. ½ NE. ¼ sec. 15, T. 10 N., R. 22 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through NW. ¼ NW. ¼ sec. 13, T. 9 N., R. 23 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through W. ½ SW. ¼ sec. 13, T. 9 N., R. 23 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through S. ½ SE. ¼ sec. 29, T. 9 N., R. 24 E., W. M.	1.00	Do.
Do	Confirming Louise S. Bragdon transfer right of way through lot 152, Grandview orchard tracts.	1.00	Do.
Do	Additional right of way Ryder lateral in SW. ¼ SW. ¼ sec. 15, T. 9 N., R. 23 E., W. M.	.....	Aug. 28, 1912
Do	Defining right of way Sunnyside Main Canal through Zillah Heights orchard tracts, sec. 1, T. 10 N., R. 21 E., W. M.	1.00	Oct. 19, 1912
Do	Defining right of way Sunnyside Main Canal through NE. ¼ and NE. ¼ SE. ¼ sec. 11, T. 9 N., R. 23 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through NE. ¼ NE. ¼ sec. 12, T. 10 N., R. 21 E., W. M.	1.00	Do.
Do	Defining right of way through NW. ¼ SW. ¼ NE. ¼ and W. ½ SE. ¼ sec. 21, T. 10 N., R. 23 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through SE. ¼ SW. ¼ sec. 17, T. 10 N., R. 23 E., W. M.	1.00	Do.
Do	Defining right of way Sunnyside Main Canal through S. ½ SE. ¼ NW. ¼, SW. ¼ NE. ¼, and N. ½ SE. ¼ sec. 3, T. 9 N., R. 23 E., W. M.	1.00	Do.
Waterstrat, Paul	Defining right of way South Branch Snipes Mountain lateral through ½ SE. ¼ NW. sec. 10, T. 9 N., R. 22 E., W. M.	1.00	July 23, 1912
Webber, Harold A., and wife	Defining right of way Sunnyside Main Canal through NW. ¼ NW. ¼ sec. 34, T. 10 N., R. 23 E., W. M.	.....	Sept. 5, 1912
Weddle, Mary J	Easement for wagon road over NE. ¼ NE. ¼ sec. 8, T. 14 N., R. 16 E., W. M.	1.00	Do.
White, Isaac, and wife	Defining right of way Sunnyside Main Canal over NE. ¼ SW. ¼ and NE. ¼ NW. ¼ SW. ¼ sec. 15, T. 11 N., R. 20 E., W. M.	.....	Mar. 3, 1913
Williams, Chas. E	Additional right of way Ryder lateral in NW. ¼ NW. ¼ sec. 22, T. 9 N., R. 23 E., W. M.	200.00	Aug. 8, 1912
Yakima County	Additional right of way Sunnyside Main Canal through sec. 3, T. 10 N., R. 21 E., W. M.	146.00	Aug. 10, 1912
Do	Defining right of way Snipes Mountain lateral through NW. ¼ and SW. ¼ sec. 35, T. 10 N., R. 22 E., W. M.	.....	Oct. 7, 1912
Zillah, town of	Defining right of way Zillah wasteway over NE. ¼ NE. ¼ sec. 36, T. 11 N., R. 20 E., W. M.	.....	July 2, 1912

PRINCIPAL CURRENT CONTRACTS.

In the following tables are shown, by projects, data relative to the principal contracts in operation or completed during the fiscal year ending June 30, 1913:

Principal current contracts.

ARIZONA, SALT RIVER PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1913.	Completion due.
362	Apr. 6, 1911	S. Morgan Smith..	Water wheels.....	$18,100.00	$12,066.67	Dec. 17, 1911
402	Aug. 2, 1911	Moloney Electric Co.	Transformers.....	5,720.00	[1] 4,760.00	Oct. 21, 1911
....	Dec. 24, 1912	Herbert J. Mann..	Concrete structures.	19,643.82	[1] 19,643.82	
484	Jan. 30, 1913	J. H. Roebling Sons Co.	Wire.....	7,206.10	5,404.58	Apr. 19, 1913
485	Jan. 31, 1913	Chicago Steel Products Co.	Tower tops.....	22,569.00	.....	May 5, 1913
486	Feb. 3, 1913	Pierson Roeding Co.	Insulator chains...	10,160.00	.....	Apr. 19, 1913

COLORADO, GRAND VALLEY PROJECT.

500	June 28, 1913	Reynolds Ely Construction Co.	Earthwork, Canyon division Main Canal.	$109,568.00	.....	Sept. 30, 1914

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

427	Dec. 14, 1911	Sayler Construction Co.	East Canal enlargement.	$18,060.00	[1] $19,216.51	July 31, 1912
436	Feb. 15, 1912	Maney Bros. & Co.	West Canal excavation.	78,363.00	[1] 75,125.48	Sept. 1, 1912
483	Jan. 29, 1913	John Palmgren and copartners.	West Canal extension.	11,390.00	10,788.90	Aug. 1, 1913
492	May 10, 1913	Sayler Construction Co.	Canal excavation..	72,930.00	11,848.50	Dec. 31, 1913

IDAHO, BOISE PROJECT.

391	May 22, 1911	Westinghouse Electric & Mfg. Co.	Electrical apparatus.	$5,880.00	[1] $5,880.00	Aug. 20, 1911
395	July 22, 1911	Lidgerwood Mfg. Co.	Cableway apparatus.	29,676.00	[1] 30,126.00	Nov. 18, 1911
428	Jan. 17, 1912	American Locomotive Co.	Steam shovel.....	9,322.00	[1] 9,197.00	Feb. 13, 1912
442	Mar. 29, 1912	Allis-Chalmers Co.	Cement plant.....	18,090.00	[1] 14,745.00	June 5, 1912
443	Apr. 12, 1912	United Iron Works.	Rotary drier.....	1,260.00	[1] 1,260.00	May 3, 1912
466	Dec. 10, 1912	Wheeling Mold & Foundry Co.	Gates.....	26,100.00	14,775.00	Apr. 22, 1913

[1] Completed.

Principal current contracts—Continued.

IDAHO, MINIDOKA PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1913.	Completion due.
247	Aug. 5, 1908	Allis-Chalmers Co.	Electrical apparatus.	$44,590.00	$44,384.25	[1] Sept. 30, 1911
248	....do....	....do....	Turbines and pumps.	206,807.00	107,407.00	Do.[1]
250 259	Aug. 12, 1908 Oct. 30, 1908	Westinghouse Electric & Mfg. Co.	Electrical apparatus.	127,892.35	129,943.82	[1] Aug. 2, 1911
325	May 6, 1910	General Elec. Co..	Substation equipment.	12,788.00	11,455.20	[1] Sept. 1, 1910
	Aug. 29, 1912	Portland Wood Pipe Co.	Furnishing and erecting wood pipe.	6,000.00	6,202.59	[1] Dec. 4, 1912
	July 29, 1912	Minneapolis Steel Machinery Co.	Radial gates.....	3,920.00	3,470.00	[1] Sept. 12, 1912
	Nov. 18, 1912	Perine Machinery Co.	Centrifugal pumps.	1,340.00	.....	Jan. 17, 1913
	Mar. 3, 1913	Bucyrus Co.....	Electric dragline excavators.	22,300.00	.....	Aug. 31, 1913

MONTANA, FLATHEAD PROJECT.

407	Sept. 19, 1911	Nelson Rich.....	Pablo dams and canals.	$116,093.00	$145,419.64	Nov. 1, 1912

MONTANA, HUNTLEY PROJECT.

413	Oct. 10, 1911	J. S. Hilend.....	Construction structures, schedule 7.	$32,549.25	[1] $29,699.27	July 1, 1912
452	May 27, 1912	Frederick Tews...	Drainage trenches.	2,420.50	[1] 2,618.40	Oct. 1, 1912
495	June 11, 1913	E. Lindstrom.....	Construction tile drains.	38,521.50	.....	Jan. 8, 1914

MONTANA, MILK RIVER PROJECT.

454	June 14, 1912	John S. Penson...	Earthwork and structures.	$23,722.65	[1] $23,399.30	Dec. 31, 1912
455	June 21, 1912	J. E. Hilton.....	Earthwork.....	47,638.00	[1] 48,787.73	Do.
458	Aug. 7, 1912	The Wm. B. Pollock Co.	Steel pipe.....	$21,565.13	$9,485.00	Feb. 12, 1913
462	Nov. 6, 1912	Winston Bros. Co.	Earthwork, schedule 4.	77,600.00	18,846.04	Apr. 1, 1914
464	Nov. 6, 1912	Chas. Wilhite & Co.	Earthwork, schedules 1–3.	163,330.00	111,816.05	Do.
476	Dec. 21, 1912	Tebbs & Taggart..	Earthwork, schedule 1.	17,650.00	3,698.60	May 31, 1914
478	....do.....	J. E. Hilton.....	Earthwork, schedule 3.	24,300.00	12,186.86	Do.
479	Jan. 10, 1913	Chas. Wilhite & Co.	Earthwork, schedule 2.	51,700.00	23,968.60	Do.
480	Jan. 17, 1913	J. E. Hilton.....	Earthwork, schedules 1 and 3.	118,150.00	39,948.26	Do.
	May 3, 1913	Buchanan & Co...	Earthwork, schedule 2.	42,450.00	6,700.55	Do.

MONTANA, SUN RIVER PROJECT.

	Aug. 29, 1912	John L. B. Mayer.	Manufacturing of lumber.	$19,000.00	$17,855.00	.....

[1] Completed.

Principal current contracts—Continued.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1913.	Completion due.
461	Oct. 18, 1912	L. W. Dotson	Earthwork, schedule 3.	$1,746.00	[1] $2,442.15	June 1, 1913
465	Nov. 18, 1912	Henry Dore	Earthwork, schedule 2.	10,448.00	5,721.66	July 31, 1913
469	Sept. 28, 1912	J. M. Kerr	Earthwork, schedule 1.	12,656.50	6,101.13	June 1, 1913

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

LOW LINE CANAL.

481	Dec. 26, 1912	Ira M. Hewitt	Schedule 1	$6,752.00	$3,360.00	Sept. 15, 1913
477	do	W. L. Townsend	Schedules 2, 3, 4, 9, 15.	33,424.50	26,592.50	Do.
482	Jan. 9, 1913	Fred Larsen	Schedule 5	2,799.00	2,184.50	Do.
475	Dec. 21, 1912	A. J. Parish	Schedules 6 and 7	8,776.50	6,514.22	Do.
472	Dec. 27, 1912	J. F. McAllister	Schedule 8	2,707.50	1,045.00	Do.
474	Dec. 24, 1912	Peterson & Christensen.	Schedules 10 and 11.	9,929.00	4,060.00	Do.
471	do	James W. Talmage	Schedule 12	2,959.00	2,420.00	Do.
470	Dec. 23, 1912	Lacy Bros	Schedules 13 and 14.	8,716.50	3,813.75	Do.
473	Dec. 21, 1912	W. C. Broadbent	Schedules 16 and 17.	6,393.00	6,045.00	Do.

LOW LINE LATERALS.

	June 3, 1913	B. G. Connelly	Schedule 7	$978.75		Sept. 30, 1913
	do	G. F. Fish	Schedule 9	412.50		Do.
	do	S. L. Smith	Schedules 6 and 8	2,223.93		Do.
	do	H. S. Sorensen	Schedule 5	1,160.00		Do.
447	Apr. 29, 1912	Kilpatrick Bros. & Collins.	Dam No. 1	41,510.00	[1] $47,720.50	Dec. 14, 1912
449	May 24, 1912	Bartlett & Kling	Dam No. 3	348,047.00	52,694.00	June 1, 1914

NEVADA, TRUCKEE-CARSON PROJECT.

369	May 1, 1911	General Electric Co.	Electrical apparatus.	$8,213.00	[1] $7,949.00	July 10, 1911
442	Mar. 29, 1912	Allis-Chalmers Co.	Cement plant	2,200.00	[1] 2,200.00	May 21, 1912
445	Apr. 26, 1912	Pittsburgh Transformer Co.	Transformers	2,799.00	[1] 2,779.00	
451	May 31, 1912	Westinghouse Electric & Mfg. Co.	Switchboard apparatus.	1,739.00	[1] 1,922.51	July 16, 1912
467	Dec. 17, 1912	Rosedale Foundry & Machine Co.	Gates and valves	29,800.00	29,800.00	May 1, 1913

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

390	June 12, 1911	General Electric Co.	Steam power plant	$31,370.00	[1] $31,533.00	Aug. 31, 1911
396	July 25, 1911	W. E. Anderson	do	44,158.90	[1] 44,158.90	Jan. 26, 1912
400	Aug. 25, 1911	Lidgerwood Mfg. Co.	Cableways	44,160.00	[1] 44,295.00	Dec. 28, 1911
456	July 19, 1912	Traylor Eng'g & Mfg. Co.	Crushing and pulverizing machinery.	13,150.00	10,564.68	June 24, 1913
457	Aug. 1, 1912	Stephens-Adamson Mfg. Co.	Conveying machinery for cement plant.	7,226.63	7,226.63	June 8, 1913

[1] Completed.

Principal current contracts—Continued.

OREGON-CALIFORNIA, KLAMATH PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1913.	Completion due.
460	Sept. 20, 1912	Maney Bros. & Co.	Laterals, schedules 1-7.	$67,212.50	$59,722.31	Nov. 1, 1913

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

234	Apr. 8, 1909	National Surety Co.	Dam and canals...	$693,187.34	$726,715.49	July 1, 1911
493	June 5, 1913	Abram S. Perry...	Earthwork.....	10,460.00	1,682.08	Nov. 30, 1913
494	June 3, 1913	Omer Merrill.....	.....do.....	11,809.00	1,894.57	Do.
496	June 2, 1913	Gardner & Chambers.	.....do.....	4,600.20	550.12	Do.

UTAH, STRAWBERRY VALLEY PROJECT.

388	July 13, 1911	W. O. Morrison...	Indian Creek dike.	$107,090.70	[1] $103,819.28	Nov. 15, 1912
	Sept. 5, 1911	Ely Construction Co.	Indian Creek and Trail Hollow diversion canals.	26,560.00	[1] 52,754.87	Do.
	May 10, 1912	Vulcan Iron Works.	Hoisting mechanism, etc.	2,205.73	[1] 2,205.73	Aug. 5, 1912
448	May 31, 1912	Midwest Engineering Co.	Structures, Indian Creek and Trail Hollow diversion canals.	16,308.30	[1] 15,839.71	Oct. 15, 1912
450	June 1, 1912	W. O. Morrison...	.....do.....	13,805.75	[1] 13,550.07	Oct. 30, 1912

WASHINGTON, YAKIMA PROJECT.

424	Nov. 17, 1911	Albert L. Smith...	Pipe trenches, Sunnyside unit.	$4,845.00	[1] $3,602.58	Jan. 30, 1912
	Feb. 18, 1913	G. F. Joos.....	Patrol house, Tieton unit.	1,045.00	1,045.00	June 21, 1913

CEMENT.

Contracts for cement.

[The table contains data relating to the contracts for cement in operation or completed during the fiscal year ending June 30, 1913.][1]

No.	Date.	Contractor.	Price per barrel f.o.b. works.	Estimated number of barrels.	Estimated value.	Estimated earnings June 30, 1913.	Completion due.
356	Feb. 28, 1911	Pacific Portland Cement Co.	$1.55	6,000	$9,300	[1] $8,427.30	Dec. 31, 1911
368	Apr. 27, 1911	Iola Portland Cement Co..	.80	12,000	9,600	[1] 9,210.50	Mar. 31, 1912
370	May 10, 1911	Portland Cement Co. of Utah.	1.50	12,000	18,000	23,720.90	Do.
371	Apr. [illegible], 1911	Three Forks Portland Cement Co.	1.18	8,000	9,440	[1] 10,167.10	Do.
372	May 1 1911	United Kansas Portland Cement Co.	.80	12,000	9,600	[1] 9,474.40	Do.
377	May 13, 19	Pacific Portland Cement Co.	1.32	9,000	11,880	15,674.90	Do.
378	May 24, 1911	Riverside Portland Cement Co.	1.40	4,000	5,600	[1] 6,720.00	Do.
380	May 23, 1911	Southwestern Portland Cement Co.	1.37	10,000	13,700	13,736.00	Do.
389	May 18, 1911	Union Portland Cement Co.	1.30	16,500	21,450	[1] 21,049.00	Do.

[1] Completed.

Contracts for cement—Continued.

No.	Date.	Contractor.	Price per barrel f. o. b. works.	Estimated number of barrels.	Estimated value.	Estimated earnings, June 30, 1913.	Completion due.
393	May 20, 1911	Henry Cowell Lime & Cement Co.	$1.24	43,000	$53,320	$58,258.50	Mar. 31, 1912
429	Jan. 26, 1912	Iola Portland Cement Co..	.60	20,000	12,000	[1] 12,069.30	May 1, 1912
430	Jan. 23, 1912	Riverside Portland Cement Co.	1.37½	10,000	13,750	[1] 18,948.00	June 30, 1912
431	Feb. 19, 1912	Colorado Portland Cement Co.	.95	13,000	12,350	9,429.14	Mar. 31, 1913
432	.....do.....	Iola Portland Cement Co..	.70	25,000	17,500	16,149.00	Do.
434	Mar. 1, 1912	Riverside Portland Cement Co.	1.37½	12,000	16,500	1,775.00	Do.
435	Feb. 27, 1912	Pacific Portland Cement Co.	1.32	27,000	35,640	33,165.00	Do.
437	Mar. 14, 1912	Lehigh Portland Cement Co.	.75	8,000	6,000	3,182.00	Do.
439	Mar. 21, 1912	Ogden Portland Cement Co.	1.10	42,000	46,200	37,774.00	May 1, 1914
441	Mar. 30, 1912	Portland Cement Co. of Utah.	1.35	15,000	20,250	16,737.30	Mar. 31, 1913
444	Apr. 22, 1912	Southwestern Portland Cement Co.	1.30	20,000	26,000	31,538.30	Do.
446	Mar. 21, 1912	Three Forks Portland Cement Co.	1.20	5,000	6,000	4,909.20	July 31, 1913
453	June 1, 1912	Ash Grove Lime & Portland Cement Co.	.70	10,000	7,000	7,469.00	Mar. 31, 1913
463	Nov. 8, 1912	Ogden Portland Cement Co.	.99	130,000	128,700	14,138.19	Dec. 31, 1916
468	Dec. 5, 1912	Union Portland Cement Co.	.98	130,000	127,400	6,527.78	Do.
487	Feb. 24, 1913	Southwestern Portland Cement Co.	1.40	50,000	70,000	.....	May 1, 1914
488	Feb. 25, 1913	Colorado Portland Cement Co.	.99	31,000	30,690	2,146.20	Do.
489	Feb. 28, 1913	Three Forks Portland Cement Co.	1.15	50,000	57,500	.....	Do.
490	Mar. 3, 1913	Union Portland Cement Co.	.99	20,000	19,800	2,742.30	Do.
491	Mar. 12, 1913	Standard Portland Cement Corporation.	1.40	30,000	42,000	595.00	Do.

[1] Completed.

Purchases of cement during fiscal year 1913.

Contract No.	Barrels.
393	12,490
429	18,790
431	6,906
432	21,570
434	5,000
435	21,395
437	3,100
439	28,565
441	12,398
444	23,975
446	3,991
453	10,670
463	14,290
468	6,661
488	2,190
490	2,770
491	425
Total	195,186

NOTE.—The basis of award in cement contracts is usually that the sum of the price bid plus the freight charges from works to project for which cement is required shall be a minimum.

Tabulation of cement tests from Jan. 1, 1904, to June 30, 1913.

[Average of accepted cement.]

Brand.	Quantity (barrels).	Fineness.		Setting time.		Specific gravity.	Composition of briquets.
		Per cent passing No. 100 sieve.	Per cent passing No. 200 sieve.	Initial.	Final.		
				H. m.	*H. m.*		
Ash Grove	30,850	95.6	82.2	3 51	7 25	3.16	Neat; 3 to 1
Atlas (Hannibal, Mo.)	17,690	96.2	78.2	1 45	5 02	3.17	Neat; 3 to 1
Cowboy	15,645	96.1	77.1	3 11	6 15	3.16	Neat; 3 to 1
El Toro	34,075	93.5	77.7	2 36	4 57	3.16	Neat; 3 to 1
Golden Gate	218,228	95.6	77.7	3 21	5 49	3.12	Neat; 3 to 1
Ideal	134,412	95.3	78.3	3 28	7 13	3.14	Neat; 3 to 1
Iola	162,917	94.0	78.3	3 54	8 02	3.16	Neat; 3 to 1
Lehigh (Mason City, Iowa)	4,500	94.9	80.4	2 54	5 18	3.15	Neat; 3 to 1
Marquette	32,155	94.7	77.3	3 18	7 05	3.15	Neat; 3 to 1
Mount Diablo	43,740	95.0	78.8	3 40	6 22	3.13	Neat; 3 to 1
Ogden	48,855	96.1	79.2	5 14	9 22	3.17	Neat; 3 to 1
Red Devil (Devils Slide, Utah)	38,748	96.2	80.5	4 09	7 25	3.14	Neat; 3 to 1
Red Devil (Trident, Mont.)	11,871	96.9	84.5	4 37	7 46	3.14	Neat; 3 to 1
Red Diamond [1]	19,711	96.1	74.8	3 57	8 22	3.15	Neat; 3 to 1
Riverside	18,800	96.2	81.2	5 18	8 39	3.14	Neat; 3 to 1
Standard (Napa Junction, Cal.)	9,261	97.7	86.9	3 55	6 38	2.99	Neat; 3 to 1
Sunflower	95,030	94.3	78.1	3 39	7 23	3.15	Neat; 3 to 1
Universal (South Chicago, Ill.)	184,100	96.9	81.0	3 24	7 26	3.14	Neat; 3 to 1
Utah [1]	26,498	97.0	81.6	4 34	7 36	3.15	Neat; 3 to 1
Yankton	28,484	96.3	80.4	3 53	8 28	3.21	Neat; 3 to 1
Total	1,175,570	95.5	79.0	3 40	7 10	3.14	Neat; 3 to 1

[1] Made by same company, brand name changed from Red Diamond to Utah, June, 1910.

NOTE.—In considering the results of long-time tests, as shown above, it should be borne in mind that while the results for the different periods are approximately comparable, they are not directly comparable, as in most cases there is a difference in the number of briquets represented by the results for various periods on the different brands, owing to the fact that new sets are being started from time to time, the results of which become available at different periods.

Tabulation of cement tests from Jan. 1, 1904, to June 30, 1913.

[Average of accepted cement.]

Tensile strength.																	
1 day.		7 days.		28 days.		3 months.		6 months.		1 year.		2 years.		3 years.		5 years.	
Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.
30	361	650	766	650	644	40	770	30	767	30	733	30	769	10	743	....	....
....	....	650	348	650	452	40	470	30	467	30	442	30	444	10	455	....	....
30	353	385	603	385	667	30	705	30	670	30	689	30	739	15	670	5	698
....	....	385	235	385	358	30	467	30	437	30	439	30	413	15	396	5	438
30	294	575	756	575	876	30	845	30	840	30	810	30	775	25	736	25	719
....	....	575	279	575	393	30	445	30	461	30	448	30	438	25	409	25	423
300	340	619	631	619	738	305	746	190	797	80	812	40	806	5	856	....	....
....	....	619	240	619	326	305	365	190	421	80	432	40	443	5	473	....	....
95	308	7,240	649	5,874	787	235	763	85	707	60	681	35	675	20	716	....	....
....	....	7,240	214	5,874	341	235	438	85	431	60	395	35	402	20	394	....	....
100	391	2,868	673	2,873	729	100	732	100	733	95	707	90	712	80	704	50	673
....	....	2,868	288	2,873	386	100	446	100	450	95	460	90	448	80	424	50	414
115	364	3,067	771	3,067	842	130	842	120	800	120	792	115	780	95	754	55	726
....	....	3,067	315	3,067	432	130	451	120	449	120	422	115	410	95	390	55	401
10	369	119	645	119	727	10	739	10	683	5	698	....	....	....	....	....	....
....	....	119	295	119	442	10	492	10	481	5	442	....	....	....	....	....	....
35	384	635	724	635	822	35	755	35	737	35	724	35	749	30	696	15	685
....	....	635	296	635	402	35	441	35	447	35	446	35	459	30	428	15	441
30	386	433	668	433	738	30	783	25	741	25	729	5	638	5	753	....	....
....	....	433	240	433	341	30	411	25	432	25	411	5	329	5	353	....	....
25	363	1,138	681	1,138	734	25	704	20	717	10	692	5	637	....	....	....	....
....	....	1,138	310	1,138	431	25	448	20	462	10	458	5	397	....	....	....	....
40	366	972	693	972	756	45	758	45	778	45	769	35	778	25	767	5	790
....	....	972	350	972	444	45	459	45	465	45	425	35	394	25	419	5	414
30	360	446	668	446	707	30	713	25	695	20	704	10	719	....	....	....	....
....	....	446	352	446	449	30	476	25	465	20	448	10	412	....	....	....	....
35	329	1,195	649	1,195	717	45	738	45	761	40	790	40	793	40	724	40	701
....	....	1,195	302	1,195	406	45	477	45	498	40	509	40	472	40	421	40	404
10	363	351	682	351	724	10	731	10	725	10	716	....	....	....	....	....	....
....	....	351	318	351	409	10	457	10	452	10	443	....	....	....	....	....	....
15	301	310	609	330	712	20	672	10	616	10	630	10	577	10	654	....	....
....	....	310	260	330	374	20	468	10	526	10	509	10	514	10	506	....	....
70	363	1,375	793	1,375	879	70	843	70	823	70	777	65	760	60	744	35	746
....	....	1,375	288	1,375	432	70	447	70	441	70	405	65	385	60	383	35	395
70	343	3,635	659	3,635	803	70	860	70	817	70	799	70	781	70	751	60	755
....	....	3,635	263	3,635	375	70	420	70	407	70	402	70	372	70	346	60	348
35	369	1,002	616	1,007	696	40	701	40	736	30	752	5	813	....	....	....	....
....	....	1,002	330	1,007	429	40	468	40	468	30	455	5	430	....	....	....	....
85	261	945	644	945	775	60	791	60	785	60	773	60	748	60	768	30	716
....	....	945	252	945	357	60	433	60	440	60	430	60	414	60	420	30	420
1,190	344	27,960	681	26,624	776	1,360	769	1,050	768	875	756	710	754	550	736	320	719
....	....	27,960	273	26,624	381	1,360	429	1,050	444	875	433	710	420	550	402	320	399

FINANCES.

RECEIPTS, ALLOTMENTS, AND INVESTMENT, BY STATES.

The table following gives a statement of additions to the reclamation fund from the sale of public lands and town-site lots, by States, and also shows the amounts allotted and the net investment of the Government for irrigation work in each of the reclamation States:

TABLE 1.—*Receipts from the sale of public lands, allotments, and net investment, by States.*

States.	Actual receipts to Mar. 31, 1913.	Estimated receipts for quarter ending June 30, 1913.	Tota lesti-mated to June 30, 1913.	To June 30, 1913.	
				Allotments.	Net invest-ment.
Arizona	$1,111,412.37	$35,000.00	$1,146,412.37	$16,003,004.15	$15,111,447.59
California	5,184,693.44	95,000.00	5,279,693.44	2,595,962.24	2,213,923.51
Colorado	[1] 6,483,000.00	98,000.00	6,581,000.00	8,130,357.00	5,507,275.49
Idaho	4,940,585.11	54,000.00	5,133,098.89	15,783,396.92	12,682,338.27
Idaho, sales of town lots	138,513.78				
Kansas	951,993.44	6,500.00	958,493.44	419,000.00	380,954.77
Montana	[1] 8,335,000.00	221,000.00	8,591,299.75	8,825,663.40	5,811,820.89
Montana, sales of town lots	35,299.75				
Nebraska	1,635,149.31	10,500.00	1,645,649.31	6,012,377.01	4,067,380.37
Nevada	519,633.85	9,200.00	528,833.85	6,218,503.63	5,042,095.29
New Mexico	[1] 3,856,000.00	59,000.00	3,915,000.00	4,493,343.12	2,156,730.20
North Dakota	11,821,801.07	41,000.00	11,862,801.07	2,273,351.01	1,889,841.34
Oklahoma	[1] 5,765,000.00	8,000.00	5,773,000.00	71,933.26	71,933.26
Oregon	10,317,387.80	47,000.00	10,364,387.80	4,334,218.77	3,057,086.16
South Dakota	6,753,352.65	39,000.00	6,841,036.97	3,388,000.00	3,104,846.96
South Dakota, sales of town lots	48,684.32				
Texas				2,103,200.00	676,241.91
Utah	1,728,093.61	74,000.00	1,802,093.61	3,459,877.02	2,324,008.15
Washington	6,386,566.63	25,000.00	6,411,566.63	8,329,607.98	6,396,404.45
Wyoming	4,287,140.75	43,039.36	4,354,689.67	7,377,417.38	5,578,934.20
Wyoming, sales of town lots	24,509.56				
Secondary projects				129,787.11	
Preliminary investigations				81,000.00	80,488.73
Town site development				23,000.00	16,916.04
General accounts				392,790.00	62,389.37
Total	80,323,817.44	865,239.36	81,189,056.80	100,445,790.00	76,233,056.95

[1] Estimated for January, February, and March.

During the fiscal year 1912 the General Land Office collected from the sale of public lands, not including town-site sales, a total of $6,324,012.34, which resulted in the addition to the fund of $5,657,498.88. The amount added to the fund was 89.460 per cent of the amount collected. During the fiscal year 1913 the gross receipts were approximately $4,198,000. Of this amount, $2,524,123.03 has been credited to the reclamation fund, and it is estimated that there is a balance of $1,254,076.97, which will be available before the end of the calendar year.

Table No. 2, page 33, of the Tenth Annual Report, gives a statement of the gross proceeds of sales and the corresponding receipts to the reclamation fund for each of the fiscal years from 1901 to 1910, inclusive.

TABLE 2.—*Total receipts from the sale of public lands and resulting additions to the reclamation fund.*

	Total receipts from reclamation States (not including town-site sales).	Additions to reclamation fund.	
		Amount (not including town-site receipts).	Per cent of total receipts.
Totals 1901–1911, inclusive	$78,205,936.97	$71,506,350.51	91.433
1912	6,324,012.34	5,657,498.88	89.460
1913	4,198,000.00	[1] 3,778,200.00	.....
Total	88,727,949.31	80,942,049.39	.....

[1] Actual receipts to Sept. 1, 1913, $2,524,123.03, balance estimated.

ALLOTMENTS, BY PROJECTS.

When funds become available, annual allotments are made by the Secretary of the Interior, in pursuance of which work is carried on. Table No. 3, below, gives a statement of the allotments from 1902 to June 30, 1913.

TABLE 3.—*Allotments for primary and secondary projects, town-site development, and general expenses to June 30, 1913.*

State.	Per cent chargeable.	Project.	[1] 1902–1912.	Changes during 1913.		Total.
				Reduction.	Additions.	
Arizona	.....	Salt River	$9,965,000	[2] $1,000	$385,000	$10,349,000
Arizona-California	83–17	Colorado River	45,000	[3] 45,000	.....	.....
Do	83–17	Yuma	6,720,000	[2] 47,000	51,000	6,724,000
California	.....	Orland	618,000	.....	20,000	638,000
Colorado	.....	Grand Valley	1,425,000	.....	.....	1,425,000
Do	.....	Uncompahgre	6,455,000	[2] 4,000	250,000	6,701,000
Idaho	.....	Boise	8,267,000	.....	2,140,000	10,407,000
Do	.....	Minidoka	5,126,000	.....	231,000	5,357,000
Kansas	.....	Garden City	419,000	.....	.....	419,000
Montana	.....	Huntley	1,205,000	.....	155,000	1,360,000
Do	.....	Milk River	2,241,000	.....	750,000	2,991,000
Do	.....	Sun River	1,172,000	.....	825,000	1,997,000
Montana-North Dakota	70–30	Lower Yellowstone.	3,280,000	.....	180,000	3,460,000
Nebraska-Wyoming	70–30	North Platte	8,585,000	.....	.....	8,585,000
Nevada	.....	Truckee-Carson	6,206,000	.....	.....	6,206,000
New Mexico	.....	Carlsbad	920,000	[2] 1,000	.....	919,000
Do	.....	Hondo	359,000	.....	10,000	369,000
New Mexico-Texas	60–40	Rio Grande	5,260,000	[2] 2,000	.....	5,258,000
North Dakota	.....	North Dakota pumping.	1,183,000	[2] 5,000	.....	1,178,000
Oklahoma	.....	Cimarron	12,000	[3] 12,000	.....	.....
Oregon	.....	Central Oregon	45,000	[3] 45,000	.....	.....
Do	.....	Umatilla	1,950,000	.....	10,000	1,960,000
Oregon-California	75–25	Klamath	2,994,000	[2] 1,000	.....	2,993,000
South Dakota	.....	Belle Fourche	3,300,000	[2] 17,000	105,000	3,388,000
Utah	.....	Strawberry Valley	3,407,000	.....	.....	3,407,000
Washington	.....	Okanogan	652,000	[2] 2,000	64,000	714,000
Do	.....	Yakima	6,926,000	[2] 1,000	608,000	7,533,000
Wyoming	.....	Shoshone	4,398,000	.....	395,000	4,793,000
		Secondary projects	666,000	.....	152,000	818,000
		Preliminary investigations.	.....	.....	81,000	81,000
		Town-site development.	23,000	.....	.....	23,000
	.....	General accounts	392,790	.....	.....	392,790
			94,216,790	183,000	6,412,000	100,445,790

[1] See Eleventh Annual Report.
[2] Transferred to preliminary investigations.
[3] Transferred to secondary projects.

TABLE 3.—*Allotments for primary and secondary projects, etc.*—Continued.

State.	Per cent chargeable.	Project.	Reclamation fund for building.	Reclamation fund for working.	Bond loan.
Arizona		Salt River	$9,604,000	$250,000	$495,000
Arizona-California	83–17	Yuma	5,373,000	151,000	1,200,000
California		Orland	608,000	30,000	
Colorado		Grand Valley	425,000		1,000,000
Do		Uncompahgre	5,201,000		1,500,000
Idaho		Boise	8,407,000		2,000,000
Do		Minidoka	4,656,000	701,000	
Kansas		Garden City	419,000		
Montana		Huntley	1,065,000	295,000	
Do		Milk River	1,991,000		1,000,000
Do		Sun River	1,919,000	78,000	
Montana-North Dakota	70–30	Lower Yellowstone	3,030,000	430,000	
Nebraska-Wyoming	70–30	North Platte	6,135,000	450,000	2,000,000
Nevada		Truckee-Carson	4,713,000	300,000	1,193,000
New Mexico		Carlsbad	819,000	100,000	
Do		Hondo	369,000		
New Mexico-Texas	60–40	Rio Grande	758,000		4,500,000
North Dakota		North Dakota pumping	978,000	200,000	
Oregon		Umatilla	1,525,000	110,000	325,000
Oregon-California	75–25	Klamath	2,333,000	60,000	600,000
South Dakota		Belle Fourche	3,283,000	105,000	
Utah		Strawberry Valley	1,135,000		2,272,000
Washington		Okanogan	684,000	30,000	
Do		Yakima	5,518,000	100,000	1,915,000
Wyoming		Shoshone	4,328,000	465,000	
		Secondary projects	818,000		
		Preliminary investigations	81,000		
		Town-site development	23,000		
		General accounts	392,790		
			76,590,790	3,855,000	20,000,000

RECONCILING ADMINISTRATIVE ACCOUNTS WITH TREASURY DEPARTMENT BALANCES AND STATEMENTS.

The accounts of the Treasury Department are limited to the movement of cash, either by withdrawal or deposit to the appropriations involved. The administrative accounts of the Reclamation Service as entered in the tables herein show the amount, both for receipts and disbursements, upon an accrual basis. The cash account, however, must, if correct, agree with the Treasury Department statement of funds made available by appropriations, reimbursements, expenditures, and withdrawals. Table 4, below, shows a condensed statement of cash collected, appropriated, disbursed, and on hand, and table No. 5 gives a reconciliation of the amounts of the appropriations, withdrawals, and balances used in the preparation of these financial tables, with the figures shown by the statements of the Treasury Department.

TABLE 4.—*Reclamation fund account to June 30, 1913.*

Item.		Debit.	Credit.
Balance end of fiscal year 1912, as per Eleventh Annual Report, page 270			$75,059,201.41
Receipts during fiscal year 1912:			
Appropriation warrant—			
No. 3, July 31, 1912	$1,150,000.05		
No. 23, Sept. 30, 1912	40,590.43		
No. 24, Sept. 30, 1912	3,089.87		
No. 29, Oct. 31, 1912	103,297.09		
No. 31, Nov. 30, 1912	589,217.97		
No. 34, Dec. 31, 1912	450,765.11		
No. 37, Dec. 31, 1912	3,025.41		
No. 45, Feb. 28, 1913	65,609.71		
No. 52, Mar. 31, 1913	318,859.73		
No. 53, Mar. 31, 1913	5,163.24		
No. 57, Apr. 30, 1913	616,128.67		
No. 67, June 30, 1913	1,038,983.62		
No. 69, June 30, 1913	6,506.22		
			4,391,237.12
Total			79,450,438.53
Disbursements, 273,001 vouchers, as per table		$86,446,087.80	
Collections, 31,678 vouchers, as per table			10,213,030.85
Balance with Treasurer United States, as per table		2,037,978.58	
Balance with special fiscal agents		1,179,403.00	
Total		89,663,469.38	89,663,469.38

TABLE 5.—*Balances of reclamation fund with the Treasurer of the United States to June 30, 1913.*

Item.		Appropriation.	Withdrawals.	Balances.
Total and balance end of fiscal year 1912, as per Eleventh Annual Report, page 270, table 5		$75,059,201.41	$70,853,174.86	$4,206,026.55
Fiscal year 1913		4,391,237.12	6,505,021.73	2,092,241.94
For items in Reclamation Service accounts, but not included in above, add withdrawals on direct settlements by the Auditor	$3,923.27			
Add withdrawals on requisitions	51,000.00			
	54,923.27			
Deduct repayments on deposits	659.91			
Net withdrawals			54,263.36	54,263.36
Total and balance as per Reclamation Service accounts		79,450,438.53	77,412,459.95	2,037,978.58

NOTE.—The appropriations, withdrawals, and balances for the fiscal year 1912 appearing in Table No. 4, page 270, of the Eleventh Annual Report are in agreement with the figures in the Treasury Department "Combined statement of the receipts and disbursements, balances, etc., of the United States," page 94.

DISBURSEMENTS, COLLECTIONS, AND TRANSFERS.

TABLE 6.—*Disbursement vouchers paid to June 30, 1913.*

	Quarter ended—	Number of vouchers.	Amount.
Balance from Eleventh Annual Report		239,914	$77,693,349.42
1913	Sept. 30, 1912	8,241	2,265,420.08
	Dec. 31, 1912	8,706	2,551,649.93
	Mar. 31, 1913	7,819	1,704,057.87
	June 30, 1913	8,321	2,231,610.55
Total to June 30, 1913		273,001	86,446,087.80

TABLE 7.—*Collection vouchers collected to June 30, 1913.*

	Quarter ended—	Number of vouchers.	Amount.
Balance from Eleventh Annual Report		18,417	$7,835,132.49
1913	Sept. 30, 1912	809	288,732.26
	Dec. 31, 1912	975	660,467.12
	Mar. 31, 1913	3,750	629,013.49
	June 30, 1913	7,727	799,685.49
Total to June 30, 1913		31,678	10,213,030.85

TABLE 8.—*Transfer vouchers approved to June 30, 1913.*

	Quarter ended—	Number of vouchers.	Amount.
Balance from Eleventh Annual Report		4,906	$3,875,292.64
1913	Sept. 30, 1912	258	130,902.29
	Dec. 31, 1912	285	141,174.30
	Mar. 31, 1913	248	226,516.12
	June 30, 1913	301	173,912.10
Total to June 30, 1913		5,998	4,547,797.45

INVESTMENT OF THE UNITED STATES IN PROJECTS.

Below is given a statement showing cash disbursed and received on account of the several projects and transfers between projects. The work of the service is grouped under five general heads, as follows: Primary projects, those for which specific allotments of funds are in effect and on which construction is under way; secondary projects, those for which general allotments of funds have been made for all such work as a whole and on which only preliminary studies and surveys have been made to determine their advisability and practicability; town-site operations under the acts of April 16 and June 27, 1906 (34 Stat., 116, 519); Indian irrigation projects; and general accounts, which represent those expenditures that are general in nature and are not directly chargeable to any project when first incurred, but which become a charge against all projects as a part of the general or overhead expenses of the service.

Table No. 9 gives the voucher transactions and net investment of the United States in the several primary projects to June 30, 1913.

TABLE 9.—*Voucher transactions, and net investments of the United States on primary projects to June 30, 1913.*

State.	Project.	Debits.		Credits.				Net investment.
		Disbursement vouchers.	Transfers received.	Collection vouchers.			Transfers issued.	
				Miscellaneous.	Water-right charges.			
					Building.	Operation and maintenance.		
Arizona	Salt River	$11,422,716.83	$314,514.26	$1,699,870.34	$100,000.00		$54,039.34	$9,883,321.41
Arizona-California	Yuma	6,575,439.60	174,731.07	290,563.37	136,032.56	$37,280.25	75,400.48	6,210,894.01
California	Orland	583,692.08	33,868.15	42,894.14			4,012.65	570,653.44
Colorado	Grand Valley	427,348.06	28,892.26	991.94			3,317.27	451,931.11
Do	Uncompahgre	5,246,064.34	120,129.87	292,184.30			23,022.53	5,050,987.38
Idaho	Boise	8,205,940.44	272,127.62	254,857.85			67,747.19	8,155,463.02
Do	Minidoka	5,015,891.32	250,616.75	365,064.65	316,326.66	151,291.82	137,113.27	4,296,711.67
Kansas	Garden City	379,566.69	11,381.28	4,434.20	142.50	104.50	5,312.00	380,954.77
Montana	Huntley	1,353,357.84	55,173.51	34,060.97	211,831.50	46,608.60	153,686.05	962,344.23
Do	Milk River	1,536,363.28	162,938.77	18,802.18			49,422.98	1,631,076.89
Do	Sun River	1,075,930.49	85,074.04	13,597.70	94,977.71	20,808.71	18,547.54	1,013,072.87
Montana-North Dakota	Lower Yellowstone	3,115,479.80	92,395.23	40,201.77	33,314.07	31,617.49	31,793.84	3,070,947.86
Nebraska-Wyoming	North Platte	5,604,089.24	619,801.81	74,432.90	168,134.08	157,052.11	17,838.59	5,806,433.37
Nevada	Truckee-Carson	5,186,556.96	240,724.81	58,108.44	212,744.88	93,418.25	33,418.54	5,029,591.66
New Mexico	Carlsbad	933,904.81	25,735.48	19,200.60	103,265.95	91,178.95	13,084.18	732,910.61
Do	Hondo	378,071.94	12,493.16	30,884.98			766.52	358,913.60
New Mexico-Texas	Rio Grande	1,773,971.06	137,266.91	188,704.70			31,928.49	1,690,604.78
North Dakota	North Dakota Pump	937,590.26	189,635.65	15,890.07	6,029.83	11,461.40	182,638.64	911,205.97
Oregon	Umatilla	1,662,816.44	53,036.90	55,369.62	179,254.34	46,903.73	69,065.81	1,365,259.84
Oregon-California	Klamath	2,431,000.84	63,285.32	45,558.27	257,001.00	77,401.68	31,181.81	2,083,143.40
South Dakota	Belle Fourche	3,244,314.90	79,947.48	22,694.14	94,942.93	65,578.76	36,199.59	3,104,846.96
Utah	Strawberry Valley	2,320,838.42	79,469.27	112,679.64			16,496.92	2,271,131.13
Washington	Okanogan	684,053.52	25,274.29	58,127.70	23,923.20	34,383.37	10,240.21	582,653.33
Do	Yakima-Sunnyside	2,780,189.50	111,224.16	83,458.56	507,715.90	352,012.34	63,467.65	1,884,759.21
Do	Yakima-Tieton	2,941,699.24	557,184.03	71,595.50	169,558.58	59,601.44	271,256.65	2,926,871.10
Do	Yakima-Storage	831,278.81	111,858.02	14,378.58			9,245.42	919,512.83
Wyoming	Shoshone	4,111,296.01	137,100.31	122,806.16	191,584.08	59,164.46	46,754.81	3,828,086.81
Total		80,759,462.72	4,045,880.41	4,031,413.27	2,806,779.77	1,335,867.86	1,456,998.97	75,174,283.26

Below is given a summary of the figures shown in Table No. 9, to which has been added the investment figures for secondary projects, town-site developments, Indian irrigation, and miscellaneous.

TABLE 10.—*Recapitulation and verification of voucher transactions and all net investments of the United States paid from the reclamation fund to June 30, 1913.*

Item.	Debits.		Credits.			Net investment.
	Disbursement vouchers.	Transfers received.	Collection vouchers.		Transfers issued.	
			Miscellaneous.	Water-right charges.		
Primary projects	$80,759,462.72	$4,045,880.41	$4,031,413.27	$4,142,647.63	$1,456,998.97	$75,174,283.26
Secondary projects	707,673.80	61,386.90	20,422.19		60,425.62	688,212.89
Town-site development	5,672.42	11,492.93	15.80		233.51	16,916.04
Indian irrigation	2,139,503.77	173,984.29	1,996,497.66		83,106.64	233,883.76
Miscellaneous	2,833,775.09	174,564.19	22,034.30		2,947,032.71	39,272.27
Preliminary investment		80,488.73				80,488.73
Total	86,446,087.80	4,547,797.45	6,070,383.22	4,142,647.63	4,547,797.45	76,233,056.95

COLLECTIONS.

The two tables below give information as to collections that have been made under the reclamation operations. Table No. 11 gives an analysis of the sources of all cash collections to June 30, 1913, and Table No. 12 gives, by projects, the amount returned for water-right charges.

TABLE 11.—*Recapitulation of cash collections by calendar years to June 30, 1913.*

Sources.	1903–1912	1913 (six months).	Total.
Miscellaneous sales	$741,309.35	$110,767.19	$852,076.54
Miscellaneous services	2,595,422.83	535,704.18	3,131,127.01
Temporary water rentals	1,532,540.79	197,931.35	1,730,472.14
Transportation refunds	232,872.70	12,640.27	245,512.97
Forfeitures by bidders and contractors	78,443.71	125.00	78,568.71
Water-right building charges	2,369,710.40	437,069.37	2,806,779.77
Water-right operation and maintenance charges	1,203,117.24	132,750.62	1,335,867.86
Overdisbursements	30,914.85	1,711.00	32,625.85
Total	8,784,331.87	1,428,698.98	10,213,030.85

TABLE 12.—*Collection of water-right charges by projects to June 30, 1913.*

State.	Project.	Building charges.	Operation and maintenance charges.	Total.	Refunds.	Net investment.
Arizona	Salt River	$100,000.00		$100,000.00		$100,000.00
Arizona-California	Yuma	136,032.56	$37,280.25	173,312.81		173,312.81
Idaho	Minidoka	316,326.66	151,291.82	467,618.48	$252.10	467,366.38
Kansas	Garden City	142.50	104.50	247.00	247.00	
Montana	Huntley	211,831.50	46,608.60	258,440.10	310.06	258,130.04
Do	Sun River	94,977.71	20,808.71	115,786.42	881.82	114,904.60
Montana-North Dakota	Lower Yellowstone	33,314.07	31,617.49	64,931.56		64,931.56
Nebraska-Wyoming	North Platte	168,134.08	157,052.11	325,186.19	146.40	325,039.79
Nevada	Truckee-Carson	212,744.88	93,418.25	306,163.13	252.00	305,911.13
New Mexico	Carlsbad	103,265.95	91,178.95	194,444.90		194,444.90
North Dakota	North Dakota Pumping.	6,029.83	11,461.40	17,491.23	153.00	17,338.23
Oregon	Umatilla	179,254.34	46,903.73	226,158.07	72.55	226,085.52
Do	Klamath	257,001.00	77,401.68	334,402.68	94.50	334,308.18
South Dakota	Belle Fourche	94,942.93	65,578.76	160,521.69		160,521.69
Washington	Okanogan	23,923.20	34,383.37	58,306.57	52.50	58,254.07
Do	Yakima-Sunnyside	507,715.90	352,012.34	859,728.24	2,131.80	857,596.44
Do	Yakima-Tieton	169,558.58	59,601.44	229,160.02	762.60	228,397.42
Wyoming	Shoshone	191,584.08	59,164.46	250,748.54	1,444.54	249,304.00
Total		2,806,779.77	1,335,867.86	4,142,647.63	6,800.87	4,135,846.76

The three tables below for the Rio Grande Dam appropriation give information similar to that appearing in Tables 4 to 7, with corresponding titles for the reclamation fund.

TABLE 13.—*Special appropriation for Rio Grande (Engle) Dam (34 Stat., 1357) to June 30, 1913.*

	Debit.	Credit.
Appropriation warrant No. 79, Mar. 4, 1907		$1,000,000.00
Disbursements, 2,895 vouchers	$998,590.78	
Collections, 24 vouchers		91.78
Balance with Treasurer of United States	1,501.00	
Total	1,000,091.78	1,000,091.78

TABLE 14.—*Balances of appropriations for Rio Grande (Engle) Dam with Treasurer of the United States, June 30, 1907, to June 30, 1913.*

Fiscal year.	Appropriation.	Withdrawals.	Balances.
1907	$1,000,000.00		$1,000,000.00
1908		$33,113.21	966,886.79
1909		137,074.22	829,812.57
1910		247,217.23	582,595.34
1911		327,875.96	254,719.38
1912		214,052.49	40,666.89
1913		39,165.89	1,501.00
Totals and balances per Treasury accounts, June 30, 1913	1,000,000.00	998,499.00	1,501.00

NOTE.—The appropriations, withdrawals, and balances for the fiscal year 1912 appearing in Table No. 13, paragraph 274, of the Eleventh Annual Report are in agreement with the figures in the Treasury Department "Combined statement of the receipts and disbursements, balances, etc., of the United States," page 94.

TABLE 15.—*Disbursement and collection vouchers, appropriation for Rio Grande (Engle) Dam, paid and collected to June 30, 1913.*

	Disbursement vouchers.		Collection vouchers.	
	Number.	Amount.	Number.	Amount.
Balance from Eleventh Annual Report	2,353	$683,655.54	21	$85.08
Sept. 30, 1911	493	176,897.21	2	5.70
Dec. 31, 1912	19	7,809.45		
Mar. 31, 1912	14	77,843.67		
June 30, 1912	6	13,218.02		
Sept. 30, 1912	4	24,804.85	1	1.00
Dec. 31, 1912	3	10,741.46		
Mar. 31, 1913	3	3,620.58		
June 30, 1913				
Total	2,895	998,590.78	24	91.78

RECLAMATION DEPOSIT ACCOUNT.

Below is a statement of receipts, payments, and balances and a list of the items making up the final balance to June 30, 1913. A description of the nature of the account appears on page 51 of the Tenth Annual Report.

TABLE 16.—*Receipts and payments from reclamation deposit account during fiscal year 1913.*

Dates.	Receipts.	Payment.	Balance.
July, 1912	[1] $5,760	$5,760	
August, 1912			
September, 1912	7,500		$7,500
October, 1912	45,600	5,750	47,350
November, 1912	15,400	54,150	8,600
December, 1912	27,900	13,300	23,200
January, 1913	50,468	28,100	45,568
February, 1913	3,500	5,368	43,700
March, 1913		39,500	4,200
April, 1913		4,200	
May, 1913	79,250	5,800	73,450
June, 1913	19,950	44,900	48,500
Total	255,328	206,828	48,500

[1] Balance on hand June 30, 1912. See Eleventh Annual Report, page 275, Table 16.

Outstanding checks, June 30, 1913.

No. 44, June 17, 1913, Omer Merrill	$200
No. 45, June 17, 1913, Abram S. Perry	200
No. 46, June 23, 1913, E. Lindstrom	1,600
No. 47, June 23, 1913, McDonald & Savaresy	1,600
	3,600
Treasury balance	52,100

Amounts held pending award of contracts.

Bids opened.	For —	Bidder.	Amount.
Apr. 30, 1913	Construction of Pishkun reservoir supply canal and tunnels etc., Sun River project.	McArthur Bros. Co	$20,900
Apr. 28, 1913	Steam shovels, Milk River project	Marion Steam Shovel Co	400
Do	do	Bucyrus Co	400
Do	Earthwork, St. Mary Canal, storage unit, Milk River project.	Cardston Construction Co	4,500
May 5, 1913	Explosives and blasting supplies	Keystone National Powder Co	500
Do	do	E. I. duPont de Nemours Powder Co	750
Do	do	Hercules Powder Co	750
Do	do	The Giant Powder Co	750
Do	do	Independent Powder Co	750
May 8, 1913	Earthwork, North Canal and laterals, Belle Fourche project.	Harley L. Shevling	100
Do	do	Albert F. Longpre	300
Do	do	Gardner & Chambers	200
Do	do	Townsend & Parrish	500
June 2, 1913	Earthwork, Canyon division, Main Canal, Grand Valley project.	Kilpatrick Bros	4,000
Do	do	The Morrison Contracting & Mfg. Co	4,000
Do	do	Reynolds Ely Construction Co	4,000
Do	do	John J. Lumsden & Co	4,000
Do	do	Hewitt & Felch	1,700
	Total		48,500

TABLE 17.—*Assets and liabilities and closed accounts, Washington office, June 30, 1913.*

ASSETS.

Cash in special fiscal agent's possession awaiting remittance	$97.25
Accounts receivable, miscellaneous	223.64

Inventories:			
Equipment in use		$29,756.72	
Materials, supplies, etc., in storehouse		21,505.95	
Products of local operations		991.72	
Undistributed cost (freight and handling on inventory property)		1,093.11	
			$53,347.50
Undistributed balance—			
Work in process		1,907.86	
Less credits from incidental operations—			
Rentals telephones	$302.64		
Revenues, miscellaneous	1,603.49		
		1,906.13	
			1.73
Total assets			53,670.12

LIABILITIES.

Accounts payable:			
Labor		3,507.66	
Purchaees		1,940.99	
Freight and express		112.86	
Passenger fares		1,579.69	
Miscellaneous		199.94	
			7,341.14
Reserves, for depreciation on plant and equipment			7,056.71
Net investment:			
Disbursement vouchers	2,833,775.09		
Transfers received	174,564.19		
		3,008,339.28	
Less—			
Collection vouchers	22,034.30		
Transfers issued	2,947,032.71		
		2,969,067.01	
			39,272.27
Total liabilities			53,670.12

TABLE 18.—*Assets and liabilities, secondary projects, June 30, 1913.*

ASSETS.

Inventories, storehouse	$224.42
Improvements to land	754,937.97
Total assets	755,162.39

LIABILITIES.

Net investment:		
Disbursement vouchers	$774,653.21	
Transfers received	61,407.61	
		836,060.82
Less—		
Collection vouchers	20,422.81	
Transfers issued	60,475,62	
		80,898.43
Total liabilities		755,162.39

Cost to June 30, 1913, secondary projects.

Arizona:	
Little Colorado	$9,554.33
San Carlos	24,823.18
San Pedro	2,427.34
California:	
Owens Valley	12,061.92
Sacramento Valley	43,608.42
San Joaquin	3,531.20

Colorado:	
White River	$4,357.00
Colorado River storage	43,710.00
Idaho:	
Dubois	17,228.91
Port Neuf	2,168.01
Montana:	
Clark Fork	5,581.23
Crow Reservation	18,911.96
Lake Basin	7,103.26
Madison River	10,729.09
Marias	13,337.86
Nebraska, South Platte	2,877.01
Nevada, Walker River	12,503.63
New Mexico:	
La Plata	28,064.33
Las Vegas	5,014.09
Urton Lake	17,464.70
North Dakota:	
Bismarck	13,621.69
Little Missouri	11,933.52
Nesson	17,471.83
Washburn	10,531.53
Bowman	3,792.44
Oklahoma:	
Cimarron	11,499.57
Red River	60,209.27
Oregon:	
Malheur	83,490.62
Central Oregon	40,366.67
Oregon cooperative	5,611.48
Utah:	
Bear Lake	18,827.72
Utah Lake	34,049.30
Washington:	
Palouse	76,391.97
Priest Rapids	6,216.01
Wapato	36,415.15
Benton	11,167.45
Kittitas	19,366.90
Wyoming, De Smedt	8,917.38
	754,937.97

TABLE 19.—*Assets and liabilities—Town-site development, June 30, 1913.*

Improvements to land			$16,916.04
LIABILITIES.			
Net investment:			
Disbursement vouchers	$5,672.42		
Transfer vouchers received	11,492.93		
		$17,165.35	
Less—			
Collection vouchers	15.80		
Transfer vouchers issued	233.51		
		249.31	
Total liabilities			16,916.04
Costs to June 30, 1913, town sites.			
Idaho, Minidoka			$9,008.16
Montana:			
Huntley			1,461.38
Sun River			1,272.39
South Dakota, Bellfourche			2,292.60
Wyoming, Shoshone			2,881.51
Total			16,916.04

TABLE 20.—*Cost adjustments and revenue credits to June 30, 1918.*

Project.	Cost adjustments.				
	Contractors' freight refunds.	Forfeitures by bidders and contractors.	Profits messes, mercantile stores, hospitals.	Miscellaneous profits.	Total adjustments.
Arizona: Salt River	$8,388.14	$3,280.00	$19,180.55		$30,848.69
Arizona-California: Yuma	18,506.11		59,933.26		78,439.37
California: Orland	221.35	1,725.00	8.46		1,954.81
Colorado: Grand Valley			1,455.43		1,455.43
Uncompahgre Valley	2,475.89		29,072.85		31,548.74
Idaho: Boise	12,293.14	19,167.92	56,393.42	$71.86	87,926.34
Minidoka	308.60	25.00	[1] 4,672.27	84.37	[1] 4,254.30
Kansas: Garden City	1,911.73	5,800.00	1,446.40		9,158.13
Montana: Huntley	7,494.07				7,494.07
St. Mary, storage	4,072.80	910.00	[1] 3,214.40	458.79	2,227.19
Sun River	830.42		7,551.00		8,381.42
Montana-North Dakota: Lower Yellowstone	21,261.33		[1] 5,643.60		15,617.73
Nebraska-Wyoming: North Platte	12,583.74	16,255.00	205.72		29,044.46
Nevada: Truckee-Carson	300.00	499.95	26,217.34	4,338.35	31,355.64
New Mexico: Hondo	159.63				159.63
New Mexico-Texas: Rio Grande	4,148.43	1,463.43	23,990.28		29,602.14
North Dakota: North Dakota Pumping	5,495.08		1,357.05		6,852.13
Oregon: Umatilla			[1] 257.11		[1] 257.11
Oregon-California: Klamath	8,314.31		[1] 12.44		8,301.87
South Dakota: Belle Fourche	2,535.93	7,337.50	[1] 3,392.17		6,481.26
Utah: Strawberry Valley			17,957.97		17,957.97
Washington: Okanogan			[1] 193.83		[1] 193.83
Yakima, storage			17,978.94		17,978.94
Yakima-Sunnyside	8,905.62	18,671.30	7,984.39		35,561.31
Yakima-Tieton	5,100.45		10,343.06		15,443.51
Wyoming: Shoshone	19,137.72	42,000.00	[1] 6,833.36		54,304.36
Montana: Blackfeet			27,393.39		27,393.39
Flathead	813.85		22,565.21		23,379.06
Fort Peck			6,818.86		6,818.86
Jackson Lake Enlargement			3.57		3.57
Total	145,258.34	117,135.10	313,637.97	4,953.37	580,984.78

[1] Deduct—Cost of operation exceeds returns.

TABLE 20.—*Cost adjustments and revenue credits to June 30, 1913*—Continued.

Project.	Building revenue accruals.						
	Rentals, cottages.	Rentals, grazing lands.	Rentals, power and light.	Rentals of irrigation water.	Telephone tolls.	Miscellaneous revenues.	Total building revenues.
Arizona: Salt River	$5,436.37	$18,806.14	$302,334.88	$861,965.11		$6,164.69	$1,194,707.19
Arizona-California: Yuma				173,399.10		2,439.25	175,838.35
California: Orland	624.00	2,614.00		33,445.75		1,104.42	37,788.17
Colorado: Grand Valley	2.50	601.50				2.00	606.00
Uncompahgre Valley	17,801.98			180,045.57		400.00	198,247.55
Idaho: Boise	9,973.42	10,189.65	16,597.12	178,442.04		18,910.86	234,113.09
Minidoka	2,554.18	430.00		51,637.77		71.50	54,693.45
Kansas: Garden City	499.58		13.00				512.58
Montana: Huntley	315.00	1,095.69			$376.98	212.00	1,999.67
St. Mary, storage	1,534.71			4,721.97	366.84	954.50	7,578.02
Sun River	2,932.90	4,463.91			117.95	9,446.38	16,961.14
Montana-North Dakota: Lower Yellowstone	3,258.09				4,831.01		8,089.10
Nebraska-Wyoming: North Platte	2,532.25	2,258.88		3,846.50		7,226.16	15,863.79
Nevada: Truckee-Carson	3,725.67	10,463.52					14,189.19
New Mexico: Carlsbad	578.00			8,163.35		2,018.48	10,759.83
Hondo				5,713.61		15.75	5,729.36
New Mexico-Texas: Rio Grande	[1] 3,225.90		855.64	72,698.90		840.72	71,169.36
North Dakota: North Dakota Pumping	347.16			196.75			543.91
Oregon: Umatilla	3,024.25	7,102.84				10,000.00	20,127.09
Oregon-California: Klamath		1,850.00		26,886.51		811.22	29,547.73
South Dakota: Belle Fourche	2,496.18	1,390.20			85.85	30.00	4,002.23
Utah: Strawberry Valley	4,642.80	44,704.12	13,548.19		1,043.10		63,938.21
Washington: Okanogan	660.00	936.50		1,670.50			3,267.00
Yakima-storage	1,424.12	51.00		14,305.00		22,736.98	38,517.10
Yakima-Sunnyside						402.15	402.15
Yakima-Tieton	4,234.97			3,526.50			7,761.47
Wyoming: Shoshone	6,110.27	101.00		4.90	102.10	903.02	7,221.29
Montana: Blackfeet	305.09				334.60		639.69
Flathead	610.56			7,219.57	2,440.96	265.31	10,536.40
Fort Peck	20.44						20.44
Jackson Lake Enlargement	6.00						6.00
Washington office					302.64	1,603.49	1,906.13
Total	72,424.59	107,058.95	333,348.83	1,627,889.40	10,002.03	86,558.88	2,237,282.68

[1] Deduct—Cost of operation exceeds returns.

TABLE 20.—*Cost adjustments and revenue credits to June 30, 1913*—Continued.

Project.	Operation and maintenance revenue accruals.							
	Operation and maintenance accruals.	Operation and maintenance forfeitures.	Operation and maintenance advanced collections.	Rental of lands and buildings.	Rental of power and light.	Rental of irrigation water.	Miscellaneous revenues.	Total operation and maintenance revenues.
Arizona-California: Yuma	$50,032.00	$79.00		$504.00				$50,645.00
Idaho: Minidoka	278,012.31	1,631.24	$1,234.96	301.00	$19,598.60	$135,426.15	$1,631.49	437,835.75
Montana: Huntley	62,056.81	851.23		2,567.80		48.00		65,523.84
Sun River	34,010.26	140.36				343.75		34,494.37
Montana-North Dakota: Lower Yellowstone	124,934.97	18.75	488.50	25.00		12.50		125,479.72
Nebraska-Wyoming: North Platte	263,180.88	1,058.40	524.40			8,619.75		273,383.43
Nevada: Truckee-Carson	116,616.83	1,185.07	288.45	165.00	3,140.97	4,780.90	579.91	126,757.13
New Mexico: Carlsbad	95,996.55	85.95	211.55	1,588.44		3,675.81	1,410.32	102,968.62
North Dakota: North Dakota Pumping	38,483.96	26.25	.95	739.44	8,250.32		92.37	47,593.29
Oregon: Umatilla	66,709.11	1.39	113.75			3,000.40		69,824.65
Oregon-California: Klamath	100,982.25		24.75			1,746.00		102,753.00
South Dakota: Belle Fourche	99,998.01	178.69	11.20			560.39	16.05	100,764.25
Washington: Okanogan	34,566.87					51,845.50		86,412.37
Yakima-Sunnyside	395,995.39		473.58	517.50	1,989.20	34,940.05	9,480.11	439,395.83
Yakima-Tieton	90,857.58		45.00	1,205.70		97.50		92,205.78
Wyoming: Shoshone	68,133.63	1,560.53	1,621.05			178.23		71,493.44
Total	1,920,597.41	6,816.77	5,038.14	7,613.88	32,979.09	245,274.93	9,210.25	2,227,530.47

UNIT BIDS AND CONTRACT PRICES.

Unit bids and contract prices on formal specifications.

CONCRETE.

State and project.	Date.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Sun River	Apr. 30, 1913	232	Supply canals, schedule 5, portal of tunnel No. 2	Cubic yards	350	$15.00	$20.00	$20.00
Do	do	232	Supply canals, schedule 6, portal of tunnel No. 3	do	320	15.00	20.00	20.00

EMBANKMENT ROLLED.

Montana, Sun River	Apr. 30, 1913	232	Supply canals, schedule 1, Pishkun Reservoir supply	Cubic yards	90,000	$0.07	$0.12	$0.12
Do	do	232	Supply canals, schedule 2, Sun River Slope Canal, Spring Valley division, station O, 535	do	27,000	.07	.12	.12
Do	do	232	Supply canals, schedule 3, stations 535–1329	do	2,000	.04	.07	.15

EXCAVATION, CLASS 1, EARTH.

Oregon-California, Klamath	Aug. 20, 1912	217	Laterals, second unit, schedule 1, North Poe Valley lateral	Cubic yards	33,000	$0.20	$0.21	[1] $0.21
Do	do	217	Laterals, second unit, schedule 2	do	30,000	.20	.21	[1] .21
Do	do	217	Schedule 3, South Poe Valley lateral	do	40,000	.12½	.21	[1] .21
Do	do	217	Schedule 4, South Poe Valley lateral	do	77,000	.12½	.17	[1] .21
Do	do	217	Schedule 5, Nuss Lake lateral	do	26,000	.19	.20	[1] .21
Do	do	217	Schedule 6, Griffith lateral	do	32,000	.21	.21¾	[1] .21
Do	do	217	Schedule 7, Griffith lateral	do	23,000	.19	.21	[1] .21
Montana-North Dakota, Lower Yellowstone.	Aug. 9, 1912	218	Extension, Main Canal and laterals, schedule 1, lateral K.	do	74,450	.17	.19	.17
Do	do	218	Extension, Main Canal and laterals, schedule 2, lateral Q.	do	54,700	.19	.....	.19
Do	do	218	Extension, Main Canal and laterals, schedule 3, lateral D.	do	11,600	.15	.....	.15
Montana, Milk River division	Oct. 14, 1912	220	Dodson South Canal, schedule 1, stations 505 to 969	do	183,000	.19	.20	.20
Do	do	220	Dodson South Canal, schedule 2, stations 971 to 1617	do	378,000	.167	.17	.17
Do	do	220	Dodson South Canal, schedule 3, stations 1617 to 2190	do	324,000	.167	.17	.18
Do	do	220	Dodson South Canal, schedule 4, stations 2190 to 2314	do	390,000	.19	.20	.19
Do	Nov. 11, 1912	222	Dodson North Canal, schedule 1, stations 510 to 813	do	105,500	.16	.20	.16
Do	do	222	Dodson North Canal, schedule 2, stations 814 to 897	do	200,000	.19	.20	[2]
Do	do	222	Dodson North Canal, schedule 3, stations 897 to 1047	do	88,000	.17	.20	.20

Nebraska–Wyoming, North Platte	Nov. 26, 1912							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Montana, Milk River	Dec. 2, 1912							
Do	do							
Do	do							
Do	Apr. 28, 1913							
Do	do							
Do	do							
Montana, Sun River	Apr. 30, 1913							
Do	do							
Do	do							
Do	do							
Do	do							
Do	do							
Colorado, Grand Valley	June 2, 1913							
Do	do							
Do	do							
Do	do							
Do	do							

[1] All schedules or none.

225	Lowline Canal, schedule 1, stations 4+50 to 76	do	37,200	.12½	.13½	.14		
225	Lowline Canal, schedule 2, stations 76 to 114	do	90,000	.12½	.14	.17		
225	Lowline Canal, schedule 3, stations 114 to 158	do	21,800	.12	.12½	.12		
225	Lowline Canal, schedule 4, stations 158 to 212	do	28,500	.12	.12½	.12		
225	Lowline Canal, schedule 5, stations 212 to 280	do	25,800	.09½	.12	.09½		
225	Lowline Canal, schedule 6, stations 280 to 339	do	17,400	.12½	.13	.13		
225	Lowline Canal, schedule 7, stations 339 to 389	do	24,500	.12½	.13	.13		
225	Lowline Canal, schedule 8, stations 389 to 426	do	21,300	.11	.12	.11		
225	Lowline Canal, schedule 9, stations 426 to 465	do	24,000	.12½	.13	.12½		
225	Lowline Canal, schedule 10, stations 465 to 558	do	35,500	.11½	.12½	.11½		
225	Lowline Canal, schedule 11, stations 559 to 661	do	38,500	.10	.12	.10		
225	Lowline Canal, schedule 12, stations 661 to 758	do	24,500	.11	.12	.11		
225	Lowline Canal, schedule 13, stations 758 to 849	do	37,000	.09¾	.0995	.09¾		
225	Lowline Canal, schedule 14, stations 849 to 930	do	39,000	.10½	.11	.11½		
225	Lowline Canal, schedule 15, stations 930 to 1027	do	31,000	.12	.12½	.12		
225	Lowline Canal, schedule 16, stations 1027 to 1130	do	24,000	.12	.12½	.12		
225	Lowline Canal, schedule 17, stations 1175 to 1298	do	27,500	.10	.12½	.10		
226	Vandalia South Canal, schedule 1, stations 16–123 and 160–533.	Cubic yards	400,000	.18	.19	.19		
226	Vandalia South Canal, schedule 2, stations 534–1460	do	302,000	.17	.18	.17		
226	Vandalia South Canal, schedule 3, stations 1460–2460	do	180,000	.18	.18½	.18		
231	St. Mary Canal, schedule 1, stations 19–277	do	267,000	.24	.50	.24		
231	St. Mary Canal, schedule 3, stations 612–920	do	496,500	[3].20, .24	.35	[3].20, .24		
231	St. Mary Canal, schedule 4, stations 934–1422	do	428,000	.22	.26	.22		
232	Supply canals, schedule 1, Pishkun Reservoir Supply Canal.	do	610,000	.23	.25	.23		
232	Supply canals, schedule 2, Sun River Slope Canal, Spring Valley division, stations 0 to 535.	do	687,000	.26½	.27	.27		
232	Supply canals, schedule 3, Spring Valley division, stations 535–1329.	do	408,000	.17	.18	.17		
232	Supply canals, schedule 4, Greenfield's division	do	360,000	.18	.19	.19		
232	Supply canals, schedule 5, tunnel No. 2	do	5,800	.25	.45	.25		
232	Supply canals, schedule 6, tunnel No. 3	do	6,400	.25	.45	.25		
239	Main Canal, Canyon division schedule 1, station 1 to station 45.	do	90,500	.18	.18½	.18		
239	Main Canal, Canyon division, schedule 2, station 45 to station 87.	do	54,500	.18	.189	.18		
239	Main Canal, Canyon division, schedule 3, station 134+80 to station 150.	do	41,000	.18	.189	.18		
239	Main Canal, Canyon division, schedule 4, station 150 to station 209+50.	do	137,000	.18	.186	.18		
239	Main Canal, Canyon division, schedule 5, station 229 to station 242.	do	27,000	.18	.185	.18		

[2] All bids rejected.

[3] $0.24, stations 650–775; $0.20, stations 775–920.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 1, EARTH—Continued.

State and project.	Date.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 3, stations 120 to 165.	Cubic yards	10,000	$0.22	$0.50	$0.22
Do	do	233	Selig Extension Canal, schedule 4, stations 165–171	do	1,000	.22	.25	.22
Do	do	233	Selig Extension Canal, schedule 5, stations 171–206	do	6,000	.22	.26	.22
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212	do	200	.22	.25	.22
Do	do	233	Selig Extension Canal, schedule 7, stations 212–241	do	5,000	.22	.26	.22
Do	do	233	Selig Extension Canal, schedule 8, stations 241–310	do	12,000	.18	.50	.18
Do	do	233	Selig Extension Canal, schedule 9, stations 310–380	do	16,000	.22	.50	.22
Do	do	233	Selig Extension Canal, schedule 10, stations 380–435+25.	do	8,000	.22	.50	.22
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447.	do	3,000	.22	.25	.22
Do	do	233	Selig Extension Canal, schedule 12, stations 447–466+75.	do	6,000	.25	.50	.22
Do	do	233	Selig Extension Canal, schedule 13, Peach Valley laterals, stations 0–100.	do	12,000	.22	.50	.22
Do	do	233	Selig Extension Canal, schedule 14, Peach Valley laterals, stations 100–181+50.	do	10,400	.22	.50	.22
South Dakota, Belle Fourche	May 18, 1913	234	North Canal extension, schedule 1, stations 1659–1780.	do	60,000	.16	.17½	.16
Do	do	234	North Canal extension, schedule 2, stations 1780–1861.	do	56,000	.189	.19	.189
Do	do	234	North Canal extension, schedule 3, laterals	do	27,000	.16	.17	.17

EXCAVATION, CLASS 2, INDURATED MATERIAL.

Oregon-California, Klamath	Aug. 20, 1912	217	Laterals, second unit, schedule 1, North Poe Valley laterals.	Cubic yards	6,200	$0.35	$0.49	[1] $0.35
Do	do	217	Laterals, second unit, schedule 2, North Poe Valley laterals.	do	5,000	.35	.49	[1] .35
Do	do	217	Laterals, second unit, schedule 3, South Poe Valley laterals.	do	11,000	.35	.45	[1] .35
Do	do	217	Laterals, second unit, schedule 4, South Poe Valley laterals.	do	500	.35	.37½	[1] .35
Do	do	217	Laterals, second unit, schedule 5, Nuss Lake laterals.	do	5,000	.35	.40	[1] .35
Do	do	217	Laterals, second unit, schedule 6, Griffith laterals	do	300	.35	.50	
Do	do	217	Laterals, second unit, schedule 7, Griffith laterals	do	100	.35	.37½	[1] .35

Montana-North Dakota, Lower Yellowstone.	Aug. 9, 1912	218	Extension Main Canal and laterals, schedule 1, Lateral K, extension.	do	30	.50	.17
Do	do	218	Extension Main Canal and laterals, schedule 2, main C. and lateral Q.	do	30	.50	.50
Montana-North Dakota, Lower Yellowstone.	Aug. 9, 1912	218	Extension Main Canal and laterals, schedule 3, lateral D, extension.	do	10	.25	.25
Montana, Milk River	Oct. 14, 1912	220	Dodson South Canal, schedule 1, stations 505–969	do	500	.28	.35	.50
Do	do	220	Dodson South Canal, schedule 2, stations 971–1617	do	500	.17½	.28	.50
Do	do	220	Dodson South Canal, schedule 3, stations 1617–2190	do	500	.21	.28	.50
Do	do	220	Dodson South Canal, schedule 4, stations 2190–2314	do	10,000	.28	.35	.28
Do	Nov. 11, 1912	222	Dodson North Canal, schedule 1, stations 510–813	do	500	.30	.40	.40
Do	do	222	Dodson North Canal, schedule 2, stations 814–897	do	5,000	.30	.50	(2)
Do	do	222	Dodson North Canal, schedule 3, stations 897–1047	do	20,000	.30	.40	.30
Nebraska-Wyoming, North Platte	Nov. 26, 1912	225	Lowline Canal, schedule 1, stations 4+50–76	do	2,800	.35	.40	.40
Do	do	225	Lowline Canal, schedule 2, stations 76–114	do	3,000	.30	.30	.30
Do	do	225	Lowline Canal, schedule 3, stations 114–158	do	700	.42	.42	.40
Do	do	225	Lowline Canal, schedule 4, stations 158–212	do	5,500	.40	.42	.40
Do	do	225	Lowline Canal, schedule 5, stations 212–280	do	800	.35	.40	.35
Do	do	225	Lowline Canal, schedule 6, stations 280–339	do	6,200	.40	.42	.40
Do	do	225	Lowline Canal, schedule 7, stations 339–389	do	1,200	.40	.42	.40
Do	do	225	Lowline Canal, schedule 8, stations 389–426	do	800	.40	.42	.40
Do	do	225	Lowline Canal, schedule 9, stations 426–465	do	1,500	.40	.42	.40
Do	do	225	Lowline Canal, schedule 10, stations 465–558	do	3,500	.35	.40	.35
Do	do	225	Lowline Canal, schedule 11, stations 559–661	do	1,500	.30	.35	.30
Do	do	225	Lowline Canal, schedule 12, stations 661–758	do	500	.35	.40	.40
Do	do	225	Lowline Canal, schedule 13, stations 758–849	do	1,000	.35	.40	.35
Do	do	225	Lowline Canal, schedule 14, stations 849–930	do	1,000	.35	.40	.35
Do	do	225	Lowline Canal, schedule 15, stations 930–1027	do	2,000	.35	.40	.40
Do	do	225	Lowline Canal, schedule 16, stations 1027–1130	do	1,000	.40	.42	.40
Do	do	225	Lowline Canal, schedule 17, stations 1175–1298	do	500	.35	.40	.35
Montana, Milk River	Dec. 2, 1912	226	Vandalia South Canal, schedule 1, stations 16–123 and 160–533.	do	1,000	.40	.45	.40
Do	do	226	Vandalia South Canal, schedule 2, stations 534–1460	do	500	.40	.45	.50
Do	do	226	Vandalia South Canal, schedule 3, stations 1460–2460	do	500	.40	.45	.40
Do	Apr. 23, 1913	231	St. Mary Canal, schedule 1, stations 19–277	do	10,000	.35	.64	.35
Do	do	231	St. Mary Canal, schedule 3, stations 612–920	do	10,000	.35	.55	.35
Do	do	231	St. Mary Canal, schedule 4, stations 934–1422	do	5,000	.45	.55	.60
Montana, Sun River	Apr. 30, 1913	232	Supply canals, schedule 1, Pishkun Reservation Supply Canal.	do	27,000	.40	.40	.40
Do	do	232	Supply canals, schedule 2, Sun River Slope Canal, Spring Valley division, stations 0–535.	do	56,000	.40	.42½	.40
Do	do	232	Supply canals, schedule 3, Sun River Slope Canal, Spring Valley division, stations 535–1329.	do	9,000	.37½	.40	.40
Do	do	232	Supply canals, schedule 4, Sun River Slope Canal, Greenfield's division.	do	75,000	.37½	.40	.40
Do	do	232	Supply canals, schedule 5, tunnel No. 2	do	700	.40	.45	.50
Do	do	232	Supply canals, schedule 6, tunnel No. 3	do	100	.40	.45	.50

[1] All or none.

[2] All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 2, INDURATED MATERIAL—Continued.

State and project.	Date.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 3, stations 120–165	Cubic yards	5,000	$0.47	$0.50	$0.47
Do	do	233	Selig Extension Canal, schedule 4, stations 165–171	do	1,000	.45	.47	.47
Do	do	233	Selig Extension Canal, schedule 5, stations 171–206	do	10,000	.47	.50	.47
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212	do	500	.45	.47	.47
Do	do	233	Selig Extension Canal, schedule 7, stations 212–241	do	12,000	.47	.50	.47
Do	do	233	Selig Extension Canal, schedule 8, stations 241–310	do	4,000	.45	.50	.45
Do	do	233	Selig Extension Canal, schedule 9, stations 310–380	do	6,000	.47	.50	.47
Do	do	233	Selig Extension Canal, schedule 10, stations 380–435+25.	do	2,000	.47	.50	.47
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447.	do	2,000	.45	.47	.47
Do	do	233	Selig Extension Canal, schedule 12, stations 447–466+75.	do	5,000	.47	.50	.47
Do	do	233	Selig Extension Canal, schedule 13, Peach Valley lateral, stations 0–100.	do	4,000	.47	.50	.47
Do	do	233	Selig Extension Canal, schedule 14, Peach Valley lateral, stations 100–181+50.	do	5,000	.47	.50	.47
South Dakota, Belle Fourche	May 8, 1913	234	North Canal extension, schedule 1, stations 1659–1780.	do	1,000	.18½	.19⅝	.32
Do	do	234	North Canal extension, schedule 2, stations 1780–1861.	do	2,000	.30	.40	.40
Do	do	234	North Canal extension, schedule 3, laterals	do	50	.17	.189	.17
Colorado, Grand Valley	June 2, 1913	239	Main Canal, Canyon division, schedule 1, stations 1 to 45.	do	1,500	.45	.48	.48
Do	do	239	Main Canal, Canyon division, schedule 2, stations 45 to 87.	do	1,600	.45	.48	.48
Do	do	239	Main Canal, Canyon division, schedule 3, stations 134+80 to 150.	do	500	.45	.48	.48
Do	do	239	Main Canal, Canyon division, schedule 4, stations 150 to 209+50.	do	3,000	.45	.48	.48
Do	do	239	Main Canal, Canyon division, schedule 5, stations 229–242.	do	3,000	.45	.48	.48

EXCAVATION, CLASS 2A, SHALE, CLAY AND ARGILLACEOUS MATERIAL.

Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 3, stations 120–165	Cubic yards	4,000	$0.60	$0.75	$0.60
Do	do	233	Selig Extension Canal, schedule 4, stations 165–171	do	800	.70	.75	.80
Do	do	233	Selig Extension Canal, schedule 5, stations 171–206	do	8,000	.75	.80	.80
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212	do	300	.70	.75	.80
Do	do	233	Selig Extension Canal, schedule 7, stations 212–241	do	8,000	.75	.80	.80
Do	do	233	Selig Extension Canal, schedule 8, stations 241–310	do	500	.40	.75	.40
Do	do	233	Selig Extension Canal, schedule 9, stations 310–380	do	500	.75	.80	.80
Do	do	233	Selig Extension Canal, schedule 10, stations 380–435+25.	do	100	.75	.80	.80
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447.	do	800	.70	.75	.80
Do	do	233	Selig Extension Canal, schedule 12, stations 447–466+75.	do	800	.75	.80	.80
Do	do	233	Selig Extension Canal, schedule 13, Peach Valley laterals, stations 0–100.	do	100	.75	.80	.80
Do	do	233	Selig Extension Canal, schedule 14, Peach Valley laterals, stations 100–181+50.	do	400	.75	.80	.80

EXCAVATION, CLASS 3, ROCK.

Oregon-California, Klamath	Aug. 20, 1912	217	Laterals, second unit, schedule 1, North Poe Valley laterals.	Cubic yards	1,250	$0.65	$1.25	[1] $0.65
Do	do	217	Laterals, second unit, schedule 2, North Poe Valley laterals.	do	1,200	.65	1.25	[1] .65
Do	do	217	Laterals, second unit, schedule 3, North Poe Valley laterals.	do	1,100	.65	.90	[1] .65
Do	do	217	Laterals, second unit, schedule 4, North Poe Valley laterals.	do	100	.65	.80	[1] .65
Do	do	217	Laterals, second unit, schedule 5, North Poe Valley laterals.	do	100	.65	1.00	[1] .65
Do	do	217	Laterals, second unit, schedule 6, North Poe Valley laterals.	do	100	.65	1.00	[1] .65
Do	do	217	Laterals, second unit, schedule 7, North Poe Valley laterals.	do	100	.65	.80	[1] .65

[1] All schedules or none.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 3, ROCK—Continued.

State and project.	Date.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana-North Dakota, Lower Yellowstone.	Aug. 9, 1912	218	Extension Main Canal and laterals, schedule 1, lateral K, extension.	Cubic yards	20	$1.00	.....	$0.17
Do	....do	218	Extension Main Canal and laterals, schedule 2, Main Canal and lateral Q.	....do	20	1.00	.....	1.00
Do	....do	218	Extension Main Canal and laterals, schedule 3, lateral D, extension.	....do	10	.35	.....	.35
Montana, Milk River	Oct. 14, 1912	220	Dodson South Canal, schedule 1, stations 505–969	....do	500	.75	$1.00	1.00
Do	....do	220	Dodson South Canal, schedule 2, stations 971–1617	....do	500	.17½	.75	1.00
Do	....do	220	Dodson South Canal, schedule 3, stations 1617–2190	....do	500	.21	.75	1.00
Do	....do	220	Dodson South Canal, schedule 4, stations 2190–2314	....do	500	.75	.90	1.00
Do	Nov. 11, 1912	222	Dodson North Canal, schedule 1, stations 510–813	....do	200	.60	.85	.85
Do	....do	222	Dodson North Canal, schedule 2, stations 814–897	....do	500	.30	.50	(1)
Do	....do	222	Dodson North Canal, schedule 3, stations 897–1047	....do	400	.60	1.00	1.00
Nebraska-Wyoming, North Platte	Nov. 26, 1912	225	Lowline Canal, schedule 1, stations 4+50–76	....do	10	.40	.45	.40
Do	....do	225	Lowline Canal, schedule 2, stations 76–114	....do	10	.40	.60	.40
Do	....do	225	Lowline Canal, schedule 3, stations 114–158	....do	10	.40	.50	.40
Do	....do	225	Lowline Canal, schedule 4, stations 158–212	....do	10	.40	.55	.40
Do	....do	225	Lowline Canal, schedule 5, stations 212–280	....do	10	.35	.40	.35
Do	....do	225	Lowline Canal, schedule 6, stations 280–339	....do	10	.40	.45	.40
Do	....do	225	Lowline Canal, schedule 7, stations 339–389	....do	10	.40	.45	.40
Do	....do	225	Lowline Canal, schedule 8, stations 389–426	....do	10	.40	.60	.40
Do	....do	225	Lowline Canal, schedule 9, stations 426–465	....do	10	.40	.60	.40
Do	....do	225	Lowline Canal, schedule 10, stations 465–558	....do	10	.35	.40	.35
Do	....do	225	Lowline Canal, schedule 11, stations 559–661	....do	10	.30	.35	.30
Do	....do	225	Lowline Canal, schedule 12, stations 661–758	....do	10	.35	.40	.40
Do	....do	225	Lowline Canal, schedule 13, stations 758–849	....do	10	.35	.60	.70
Do	....do	225	Lowline Canal, schedule 14, stations 849–930	....do	10	.35	.40	.70
Do	....do	225	Lowline Canal, schedule 15, stations 930–1027	....do	10	.35	.40	.40
Do	....do	225	Lowline Canal, schedule 16, stations 1027–1130	....do	10	.40	.60	.40
Do	....do	225	Lowline Canal, schedule 17, stations 1175–1298	....do	10	.40	.60	.40
Montana, Milk River	Dec. 2, 1912	226	Vandalia South Canal, schedule 1, stations 16–123 and 160–533.	....do	2,000	.90	1.00	1.00
Do	....do	226	Vandalia South Canal, schedule 2, stations 534–1460	....do	50	.90	1.00	1.00
Do	....do	226	Vandalia South Canal, schedule 3, stations 1460–2460	....do	50	.90	1.00	1.00
Do	Apr. 23, 1913	231	St. Mary Canal, schedule 1, stations 19–277	....do	500	1.00	1.00	1.00
Do	....do	231	St. Mary Canal, schedule 3, stations 612–920	....do	10,000	1.00	1.00	1.00
Do	....do	231	St. Mary Canal, schedule 4, stations 934–1422	....do	1,000	1.00	1.25	1.25

Montana, Sun River	Apr. 30, 1913	232	Supply Canals, schedule 1, Pishkun Reservoir, Supply Canal.	do	112,000	.75	.99	.75
Do	do	232	Supply Canals, schedule 2, Sun River Slope Canal, Spring Valley division, stations 0–535.	do	34,000	.75	1.00	.75
Do	do	232	Supply Canals, schedule 3, Sun River Slope Canal, Spring Valley division, stations 535–1329.	do	6,000	.75	.95	.75
Do	do	232	Supply Canals, schedule 4, Sun River Slope, Greenfield's division.	do	25,000	.75	.96¼	.75
Do	do	232	Supply Canals, schedule 5, tunnel No. 2	do	8,500	.80	.99	.80
Do	do	232	Supply Canals, schedule 6, tunnel No. 3	do	3,000	.80	.99	.80
Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 3, stations 120–165	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 4, stations 165–171	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 5, stations 171–206	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 7, stations 212–241	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 8, stations 241–310	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 9, stations 310–380	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 10, stations 380–435+26.	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447.	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 12, stations 447–466+75.	do	100	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 13, Peach Valley lateral, stations 0–100.	do	50	.30	.75	.30
Do	do	233	Selig Extension Canal, schedule 14, Peach Valley lateral, stations 100–181+50.	do	50	.30	.75	.30
South Dakota, Belle Fourche	May 8, 1913	234	North Canal Extension, schedule 1, stations 1659–1780.	do	500	.18½	.19⅔	.32
Do	do	234	North Canal Extension, schedule 2, stations 1780–1861.	do	500	.60	.65	.65
Do	do	234	North Canal Extension, schedule 3, laterals	do	10	.17	.189	.17
Colorado, Grand Valley	June 2, 1913	239	Main Canal, Canyon division, schedule 1, stations 1–45.	do	1,000	.90	.98	.98
Do	do	239	Main Canal, Canyon division, schedule 2, stations 45–87.	do	1,000	.90	.98	.98
Do	do	239	Main Canal, Canyon division, schedule 3, stations 134+80–150.	do	500	.90	.98	.98
Do	do	239	Main Canal, Canyon division, schedule 4, stations 150–209+50.	do	2,400	.90	.98	.98
Do	do	239	Main Canal, Canyon division, schedule 5, stations 229–242	do	600	.90	.98	.98

[1] All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

OVERHAUL.[1]

State and project.	Date.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana-North Dakota, Lower Yellowstone.	Aug. 9, 1912	218	Extension Main Canal and laterals	Cubic yards per 100 feet.	1,000			$0.02
Montana, Milk River	Oct. 14, 1912	220	Dodson South Canal, schedule 1, stations 505–969	do	25,000			.02
Do	do	220	Dodson South Canal, schedule 2, stations 971–1617	do	40,000			.02
Do	do	220	Dodson South Canal, schedule 3, stations 1617–2190	do	30,000			.02
Do	do	220	Dodson South Canal, schedule 4, stations 2190–2314	do	10,000			.02
Do	Nov. 11, 1912	222	Dodson North Canal, schedule 1, stations 510–813	Cubic yards	20,000			.02
Do	do	222	Dodson North Canal, schedule 2, stations 814–897	do	10,000			.02
Do	do	222	Dodson North Canal, schedule 3, stations 897–1047	do	15,000			.02
Nebraska-Wyoming, North Platte	Nov. 26, 1912	225	Lowline Canal, schedule 1, stations 4+50–76	Cubic yards per 100 feet.	28,000			.01½
Do	do	225	Lowline Canal, schedule 2, stations 76–114	do	1,300			.01½
Do	do	225	Lowline Canal, schedule 3, stations 114–158	do	4,400			.01½
Do	do	225	Lowline Canal, schedule 4, stations 158–212	do	8,100			.01½
Do	do	225	Lowline Canal, schedule 5, stations 212–280	do	4,300			.01½
Do	do	225	Lowline Canal, schedule 6, stations 280–339	do	14,900			.01½
Do	do	225	Lowline Canal, schedule 7, stations 339–389	do	9,200			.01½
Do	do	225	Lowline Canal, schedule 8, stations 389–426	do	2,700			.01½
Do	do	225	Lowline Canal, schedule 9, stations 426–465	do	13,100			.01½
Do	do	225	Lowline Canal, schedule 10, stations 465–558	do	16,000			.01½
Do	do	225	Lowline Canal, schedule 11, stations 559–661	do	5,000			.01½
Do	do	225	Lowline Canal, schedule 12, stations 661–758	do	4,000			.01½
Do	do	225	Lowline Canal, schedule 13, stations 758–849	do	4,000			.01½
Do	do	225	Lowline Canal, schedule 14, stations 849–930	do	16,000			.01½
Do	do	225	Lowline Canal, schedule 15, stations 930–1027	do	11,000			.01½
Do	do	225	Lowline Canal, schedule 16, stations 1027–1130	do	9,000			.01½
Do	do	225	Lowline Canal, schedule 17, stations 1175–1298	do	3,000			.01½
Montana, Milk River	Dec. 2, 1912	226	Vandalia South Canal, schedule 1, stations 16–123, and 160–533.	do	350,000			.02
Do	do	226	Vandalia South Canal, schedule 2, stations 534–1460	do	3,000			.02
Do	do	226	Vandalia South Canal, schedule 3, sections 1460–2460.	do	5,000			.02
Do	Apr. 28, 1913	231	St. Mary Canal, schedule 1, stations 19–277	Cubic yards	16,500			.02
Do	do	231	St. Mary Canal, schedule 3, stations 612–920	do	1,170,000			.02
Do	do	231	St. Mary Canal, schedule 4, stations 934–4422	do	281,000			.02

Montana, Sun River	Apr. 30, 1913	232	Supply canals, schedule 1, Pishkun Reservoir Supply Canal.	do	95,000			.02
Do	do	232	Supply canal, schedule 2, Sun River Slope Canal, Spring Valley division, stations 0–535.	do	14,000			.02
Do	do	232	Supply canals, schedule 3, Sun River Slope Canal, Spring Valley division, stations 535–1329.	do	7,000			.02
Do	do	232	Supply canals, schedule 4, Sun River Slope Canal, Greenfield's division.	do	5,000			.02
Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 3, stations 120–165.	do	10,000			.02
Do	do	233	Selig Extension Canal, schedule 5, stations 171–206.	do	10,000			.02
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212.	do	1,000			.02
Do	do	233	Selig Extension Canal, schedule 7, stations 212–241.	do	10,000			.02
Do	do	233	Selig Extension Canal, schedule 8, stations 241–310.	do	1,000			.02
Do	do	233	Selig Extension Canal, schedule 9, stations 310–380.	do	1,000			.02
Do	do	233	Selig Extension Canal, schedule 10, stations 380–435+25.	do	1,000			.02
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447.	do	2,000			.02
Do	do	233	Selig Extension Canal, schedule 12, stations 447–466+75.	do	5,000			.02
Do	do	233	Selig Extension Canal, schedule 13, Peach Valley laterals, stations 0–100.	do	5,000			.02
Do	do	233	Selig Extension Canal, schedule 14, Peach Valley laterals, stations 100–181+50.	do	5,000			.02
South Dakota, Belle Fourche	May 8, 1913	234	North Canal Extension, schedule 1, stations 1659–1780.	do	19,000			.02
Do	do	234	North Canal Extension, schedule 2, stations 1780–1861.	do	5,000			.02
Colorado, Grand Valley	June 2, 1913	239	Main Canal, Canyon division, schedule 1, stations 1–45.	do	950,000	$0.015	$0.016	.015
Do	do	239	Main Canal, Canyon division, schedule 2, stations 45–87.	do	140,000	.015	.018	.015
Do	do	239	Main Canal, Canyon division, schedule 3, stations 134+80–150.	do	213,000	.015	.016	.015
Do	do	239	Main Canal, Canyon division, schedule 4, stations 150–209+50.	do	825,000	.015	.02	.015
Do	do	239	Main Canal, Canyon division, schedule 5, stations 229–242.	do	25,000	.015	.018	.015

[1] Price stated in specifications.

Unit bids and contract prices on formal specifications—Continued.

RIPRAP.

State and project.	Date.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Colorado, Grand Valley	June 2, 1913	239	Main Canal, Canyon division, schedule 1, stations 1–45.	Cubic yards	1,500	$2.25	$3.50	$2.25
Do	do	239	Main Canal, Canyon division, schedule 2, stations 45–87.	do	200	2.25	3.50	2.25
Do	do	239	Main Canal, Canyon division, schedule 3, stations 229–242.	do	100	2.25	3.50	2.25
Do	do	239	Main Canal, Canyon division, schedule 4, stations 150–209+50.	do	100	2.25	3.50	2.25

STEEL, REINFORCING, PLACING.

Montana, Sun River	Apr. 30, 1913	232	Supply canals, schedule 5, tunnel No. 2	Pounds	42,000	$0.02	$0.03	$0.02
Do	do	232	Supply canals, schedule 6, tunnel No. 3	do	38,000	.02	.03	.02

TUNNEL (INCLUDING LINING).

Montana, Sun River	Apr. 30, 1913	232	Supply canals, schedule 5, tunnel No. 2	Linear feet	980	$47.00	$60.00	$47.00
Do	do	232	Supply canals, schedule 6, tunnel No. 3	do	2,235	47.00	55.00	47.00

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TUNNEL, EXCAVATING.

Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 4, stations 165–171, class 1, not timbered.	Linear feet	110	$7.25	$8.00	$7.25
			Selig Extension Canal, schedule 4, stations 165–171, class 2, timbered.	do	50	8.00	9.00	9.50
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212, class 1 not timbered.	do	310	7.25	8.00	7.25
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212, class 2, timbered.	do	50	8.00	9.00	9.50
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447, class 1, not timbered.	do	310	7.25	8.00	7.25
Do	do	233	Selig Extension Canal, schedule 11, class 2, timbered.	do	100	8.00	9.00	9.50

TUNNEL TIMBERING.

Colorado, Uncompahgre Valley	Apr. 17, 1913	233	Selig Extension Canal, schedule 4, stations 165–171	M feet B. M	4	$13.50	$15.00	$15.00
Do	do	233	Selig Extension Canal, schedule 6, stations 206–212	do	4	13.50	15.00	15.00
Do	do	233	Selig Extension Canal, schedule 11, stations 435+25–447.	do	8	13.50	15.00	15.00

SUMMARY OF RESULTS.

Results of reclamation work to June 30, 1913.

Projects.	Irrigable lands.									
	Estimated on completion.		Service could have supplied in 1913.		Season of 1913.					
					Under water rights.		Under rental contracts.		Total under contract.	
	Acres.	Farms.	Acres.	Farms.	Acres.	Farms.	Acres.	Farms.	Acres.	Farms.
Arizona:										
Salt River	230,000	5,000	180,000	3,750	.....	.....	190,000	4,000	190,000	4,000
Arizona-California: Yuma	131,000	3,500	50,000	1,250	6,500	173	19,350	397	25,850	570
California: Orland	14,307	358	14,307	358	.....	.....	6,122	237	6,122	237
Colorado:										
Grand Valley	53,000	900	.....	.....	.....	.....	.....	.....	.....	.....
Uncompahgre Valley	140,000	3,500	44,000	850	.....	.....	44,000	850	44,000	850
Idaho:										
Boise	[1] 207,000	3,000	207,000	3,000	.....	.....	82,250	1,820	82,250	1,820
Minidoka	118,025	2,179	115,600	2,086	65,000	1,149	34,700	575	99,700	1,724
Kansas: Garden City	10,677	284	.....	.....	.....	.....	.....	.....	.....	.....
Montana:										
Blackfeet	122,509	3,060	26,649	661	.....	.....	.....	.....	.....	.....
Flathead	152,000	2,980	38,000	520	.....	.....	11,444	171	11,444	171
Fort Peck	152,000	3,050	7,500	190	.....	.....	680	17	680	17
Huntley	32,405	697	28,805	627	24,188	541	.....	.....	24,188	541
Milk River	219,557	3,720	12,800	217	.....	.....	3,240	23	3,240	23
Sun River	216,346	3,610	16,346	262	10,754	194	194	3	10,948	197
Montana-North Dakota: Lower Yellowstone	60,116	725	37,799	456	29,737	348	.....	.....	29,737	348
Nebraska-Wyoming: North Platte	129,270	1,270	109,500	1,130	70,937	918	18,184	5	89,121	923
Nevada: Truckee-Carson	206,000	2,575	52,039	527	30,687	408	13,929	109	44,616	517
New Mexico:										
Carlsbad	20,277	523	20,277	523	20,227	522	50	1	20,277	523
Hondo	10,000	150	.....	.....	.....	.....	2,305	28	2,305	28
New Mexico-Texas:										
Rio Grande	155,000	5,000	.....	.....	.....	.....	.....	.....	.....	.....
Leesburg unit	.....	.....	25,000	900	.....	.....	22,115	890	22,115	890
Franklin Canal	.....	.....	12,000	600	.....	.....	12,000	600	12,000	600
North Dakota:										
North Dakota Pumping, Buford-Trenton unit	15,025	250	4,060	41	2,012	34	.....	.....	2,012	34
Williston unit	11,289	186	8,047	134	4,813	145	.....	.....	4,813	145
Oregon: Umatilla	25,000	1,250	18,300	915	13,947	517	167	2	14,114	519
Oregon-California: Klamath	70,700	1,180	29,700	493	27,677	430	2,073	20	29,750	450
South Dakota: Belle Fourche	100,000	1,400	65,852	905	46,866	661	28	2	46,894	663
Utah: Strawberry Valley	60,000	1,600	.....	.....	.....	.....	.....	.....	.....	.....
Washington:										
Okanogan	10,071	500	10,071	500	8,157	450	200	18	8,357	468
Yakima storage—										
Sunnyside	102,824	4,240	80,608	3,760	23,095	970	47,627	2,395	70,722	3,365
Tieton	34,537	1,382	34,537	1,382	23,225	925	.....	.....	23,225	925
Wyoming: Shoshone	164,122	2,500	41,310	637	23,635	401	157	5	23,792	400
Total	2,973,048	60,569	1,290,107	26,674	431,457	8,786	510,815	12,168	942,272	20,954

[1] Exclusive of 36,000 acres that may possibly be included.

Results of reclamation work to June 30, 1913—Continued.

Projects.	Available reservoir capacity (acre-feet).	Canals and ditches (miles). Canals (capacities in second-feet). Over 800.	301 to 800.	50 to 300.	Less than 50.	Waste-water ditches.	Total miles.	Tunnels. Number.	Length (feet).	Storage and diversion dams. Masonry.	Earth.	Rockfill crib.	Total.
										Cubic yards.	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*
Arizona:													
Salt River	1,284,000	32	64	72	482	14	664	23	10,802	386,800	.....	.....	386,800
Water users' unit	.....	...	6	.....	.....	...	6	...	.....	.....	.....	.....	.....
South Side unit	.....	...	...	17	49	...	66	...	.....	.....	.....	.....	.....
Indian project, Gila River unit	.....	...	...	11	9	1	21	...	.....	.....	.....	.....	.....
Arizona-California: Yuma	.....	17	5	50	151	10	233	1	930	66,714	.....	375,018	441,732
California: Orland	45,600	...	...	24	75	...	99	...	.....	12,399	.....	.....	12,399
Colorado:													
Grand Valley	.....	...	...	.....	.....	...	.....	2	2,549	.....	.....	.....	.....
Uncompahgre Valley	.....	12	15	62	121	8	218	8	35,834	1,500	.....	1,700	3,200
Idaho:													
Boise	177,640	40	57	165	705	61	1,028	1	487	89,459	2,749,500	17,600	2,856,559
Minidoka	53,500	12	32	106	436	77	663	...	.....	16,564	146,677	79,321	242,562
Idaho-Wyoming: Snake River storage	380,000	...	...	.....	.....	...	.....	...	.....	3,649	63,345	4,037	71,031
Kansas: Garden City	.....	...	...	2	2	...	4	...	.....	.....	.....	.....	.....
Montana:													
Blackfeet	16,000	...	...	62	154	...	216	...	.....	2,080	25,750	.....	27,830
Flathead	10,000	...	11	55	224	...	290	1	1,703	.....	331,428	2,238	333,666
Fort Peck	3,900	...	...	22	35	...	57	...	.....	475	34,000	450	34,925
Huntley	.....	...	10	19	196	78	303	3	2,654	.....	.....	.....	.....
Milk River	.....	8	13	29	35	16	101	...	.....	163	5,900	16,713	22,776
St. Mary storage	.....	3	...	.....	.....	...	3	...	.....	.....	.....	.....	.....
Sun River	16,700	...	...	18	103	12	133	1	584	.....	191,756	9,709	201,465
Montana-North Dakota Lower Yellowstone	.....	...	49	19	133	31	232	...	.....	.....	.....	14,000	14,000
Nebraska-Wyoming North Platte	1,081,400	90	10	65	500	10	675	5	1,249	66,410	449,065	.....	515,475
Nevada: Truckee-Carson	200,000	42	62	80	509	2	695	4	2,840	45,646	91,641	.....	137,287
New Mexico:													
Carlsbad	77,000	...	13	12	120	6	151	2	200	12,829	204,998	108,102	325,929
Hondo	40,000	...	3	2	45	...	50	...	.....	.....	421,350	3,700	425,050
New Mexico-Texas:													
Storage unit	.....	...	...	.....	.....	...	.....	...	.....	28,062	.....	.....	28,062
Leesburg unit	.....	...	6	.....	.....	...	6	...	.....	2,318	1,878	.....	4,196
Franklin Canal	.....	...	...	50	.....	...	50	...	.....	.....	.....	.....	.....
North Dakota:													
North Dakota Pumping, Buford-Trenton unit	.....	...	...	1	14	...	15	...	.....	.....	.....	.....	.....
Williston unit	.....	...	...	3	43	15	61	...	.....	.....	.....	.....	.....
Oregon: Umatilla	50,000	...	25	27	[1]80	10	142	1	34	4,380	764,000	33,890	802,270
Oregon-California: Klamath	662,000	9	1	42	107	26	185	1	3,300	5,600	36,200	33,500	75,300
South Dakota: Belle Fourche	203,770	7	43	85	339	12	486	1	1,306	38,309	1,550,800	.....	1,589,109
Utah: Strawberry Valley	.....	...	...	5	4	...	9	5	22,684	1,261	126,881	.....	128,142
Washington:													
Okanogan	15,600	...	...	10	37	1	48	1	395	131	336,630	130	336,891
Yakima storage	276,000	...	...	.....	.....	...	.....	...	.....	.....	415,998	.....	415,998
Sunnyside	.....	31	19	33	442	9	534	...	.....	2,291	.....	.....	2,291
Tieton	.....	...	12	32	193	1	238	6	10,963	609	2,070	301	2,980
Wyoming: Shoshone	458,100	10	15	26	195	33	279	11	19,246	80,527	5,200	.....	85,727
Total	5,051,210	313	471	1,206	5,538	433	7,961	77	117,760	868,176	7,955,067	700,409	9,523,652

[1] Use of several miles of canals discontinued.

Results of reclamation work to June 30, 1913—Continued.

Projects.	Dikes or levees.		Canal structures.								
			Over $2,000.		$500 to $2,000.		$100 to $500.		Less than $100.		Total.
			Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.	
Arizona:	*Feet.*	*Cu. yards.*									
Salt River	3,016	60,054	30	....	225	....	200	417	32	125	1,029
Water users' unit	.....	.....	6	....	3	....	6	.....	.....	.....	15
South Side unit	.....	.....	....	....	1	....	38	.....	1	207	247
Indian Project, Gila River unit	5,000	9,362	5	....	5	....	40	.....	.....	.....	50
Arizona-California: Yuma	276,280	2,818,154	19	....	25	5	176	239	260	464	1,188
California: Orland	625	4,000	4	....	10	....	53	7	1,119	14	1,207
Colorado:											
Grand Valley	.....	.....	....	....	....	....	3	.....	.....	.....	3
Uncompahgre Valley	2,200	9,923	23	15	17	37	28	42	5	921	1,088
Idaho:											
Boise	1,075	3,761	55	....	82	32	2,008	1,806	1,003	5,540	10,536
Minidoka	3,100	3,472	25	2	51	8	812	111	24	4,486	5,519
Kansas: Garden City	.....	.....	1	....	.....	....	.....	.....	.....	3	4
Montana:											
Blackfeet	.....	.....	3	1	5	7	16	6	83	1,064	1,185
Flathead	.....	.....	17	....	13	5	71	75	9	833	1,023
Fort Peck	.....	.....	7	....	5	....	22	1	4	168	207
Huntley	.....	.....	26	1	28	4	88	92	148	2,052	2,439
Milk River	29,800	144,442	13	1	9	....	14	21	.....	343	401
Sun River	3,192	4,600	6	....	6	....	38	16	135	473	674
Montana-North Dakota: Lower Yellowstone	35,800	138,276	48	1	90	4	48	54	71	1,183	1,499
Nebraska-Wyoming: North Platte	1,650	131,110	28	7	130	23	922	18	465	3,700	5,293
Nevada: Truckee-Carson	52,900	70,788	70	....	172	4	140	300	.....	976	1,662
New Mexico:											
Carlsbad	4,350	103,650	3	....	6	....	34	.....	326	.....	369
Hondo	.....	.....	....	....	10	....	77	.....	.....	.....	87
New Mexico-Texas:											
Storage unit	1,900	4,220	1	....	.....	....	.....	.....	.....	.....	1
Leesburg unit	1,700	16,815	4	....	.....	3	.....	.....	.....	.... ..	7
Franklin Canal	.....	.....	....	....	.....	....	6	20	.....	20	46
North Dakota:											
North Dakota Pumping, Buford Trenton unit	.....	.....	2	....	1	....	8	.....	.....	80	91
Williston unit	.....	.....	8	....	11	....	22	.....	3	445	489
Oregon: Umatilla	1,400	8,000	14	....	7	....	35	.....	430	250	736
Oregon-California: Klamath	5,700	40,300	8	5	9	21	24	28	.....	525	620
South Dakota: Belle Fourche	.....	.....	26	....	101	19	188	176	17	1,592	2,119
Utah: Strawberry Valley	1,811	102,517	8	....	2	....	.....	.....	.....	.....	10
Washington:											
Okanogan	.....	.....	1	....	2	....	.....	8	.....	487	498
Yakima storage—											
Sunnyside	1,600	18,000	56	1	13	....	185	4	51	6,000	6,310
Tieton	350	584	19	16	79	6	327	43	.....	1,600	2,090
Wyoming: Shoshone	435	5,200	30	1	34	....	86	11	858	471	1,491
Total	433,684	3,697,228	576	51	1,152	178	5,715	3,495	5,044	34,022	50,233

Results of reclamation work to June 30, 1913—Continued.

Projects.	Bridges—Number and length.													
	Steel.			Combination.			Wood.			Concrete.			Total.	
	Over 50.	Less 50.	Length.	Over 50.	Less 50.	Length.	Over 50.	Less 50.	Length.	Over 50.	Less 50.	Length.	Number.	Length.
Arizona:														
Salt River	2	1	186	10	27	1,570	3	119	1,950	4	10	672	176	4,378
Water users' unit	....	....	.....	1	....	54	....	.....	.....	1	....	66	2	120
South Side unit	....	....	.....	....	12	344	....	31	203	....	....	.....	43	547
Indian Project, Gila River unit	....	9	270	....	....	.....	....	.....	.....	....	1	25	10	295
Arizona-California: Yuma	....	....	.....	3	5	270	2	47	1,300	6	16	694	79	2,264
California: Orland	....	....	.....	....	56	510	....	3	70	....	133	670	192	1,250
Colorado: Uncompahgre Valley	....	....	.....	....	....	.....	4	74	1,704	....	....	.....	78	1,704
Idaho:														
Boise	....	....	.....	....	....	.....	38	861	13,266	....	....	.....	899	13,266
Minidoka	....	....	.....	....	4	160	36	104	5,184	....	....	.....	144	5,344
Kansas: Garden City	....	....	.....	....	....	.....	....	3	60	....	....	.....	3	60
Montana:														
Blackfeet	....	....	.....	....	....	.....	1	33	733	....	....	.....	34	733
Flathead	....	....	.....	....	....	.....	....	124	2,183	....	....	.....	124	2,183
Fort Peck	....	....	.....	....	1	36	....	13	219	....	....	.....	14	255
Huntley	....	....	.....	....	135	2,040	....	.....	.....	....	....	.....	135	2,040
Milk River	1	1	115	....	....	.....	2	31	872	....	....	.....	35	987
St. Mary storage	....	....	.....	....	....	.....	2	20	506	....	....	.....	22	506
Sun River	....	8	225	1	....	60	2	26	973	....	....	.....	37	1,258
Montana-North Dakota: Lower Yellowstone	15	16	1,474	....	6	155	8	122	1,960	....	....	.....	167	3,589
Nebraska-Wyoming: North Platte	11	....	726	11	....	726	3	99	2,311	....	....	.....	124	3,763
Nevada: Truckee-Carson	....	....	.....	6	8	692	9	118	3,798	1	....	100	142	4,590
New Mexico:														
Carlsbad	....	....	.....	....	....	.....	1	.....	225	....	....	.....	1	225
Hondo	....	....	.....	....	....	.....	....	11	130	....	....	.....	11	130
New Mexico-Texas:														
Storage unit	1	....	300	....	....	.....	2	.....	816	....	....	.....	3	1,116
Leesburg unit	....	....	.....	....	....	.....	3	.....	150	....	....	.....	3	150
Franklin Canal	....	....	.....	....	....	.....	....	57	1,710	....	....	.....	57	1,710
North Dakota:														
North Dakota Pumping, Buford Trenton unit	....	....	.....	....	4	68	....	.....	.....	....	....	.....	4	68
Williston unit	....	....	.....	....	12	225	....	3	31	....	....	.....	15	256
Oregon: Umatilla	1	....	185	....	....	.....	....	47	996	....	1	31	49	1,212
Oregon-California: Klamath	....	....	.....	....	....	.....	20	90	3,860	....	....	.....	110	3,860
South Dakota: Belle Fourche	5	....	360	....	....	.....	3	234	3,017	....	2	28	244	3,405
Utah: Strawberry Valley	....	....	.....	....	....	.....	....	24	800	....	6	250	30	1,050
Washington:														
Okanogan	....	....	.....	....	....	.....	....	3	100	....	....	.....	3	100
Yakima storage	2	....	276	....	....	.....	5	.....	380	....	....	.....	7	656
Sunnyside	1	....	500	....	....	.....	7	28	1,150	....	....	.....	36	1,650
Tieton	....	....	.....	....	....	.....	8	165	3,548	....	....	.....	173	3,548
Wyoming: Shoshone	4	3	416	....	....	.....	10	106	2,120	....	10	96	133	2,632
Total	43	38	5,033	32	270	6,910	169	2,596	56,325	12	179	2,632	3,339	70,900

Results of reclamation work to June 30, 1913—Continued.

Projects.	Culverts.									
	Concrete.		Metal.		Terra cotta.		Wood.		Total.	
	No.	Length.	No.	Length.	No.	Length.	No.	Length.	No.	Length.
		Feet.		*Feet.*		*Feet.*		*Feet.*		*Feet.*
Arizona:										
Salt River	48	2,675	....	.....	....	.....	58	2,000	106	4,675
South side	40	1,214	....	.....	....	.....	.....	.....	40	1,214
Indian project, Gila River	15	300	....	.....	....	.....	.....	.....	15	300
Arizona-California: Yuma	136	2,494	....	.....	....	.....	176	2,816	312	5,310
California: Orland	59	2,178	....	.....	....	.....	.....	.....	59	2,178
Colorado: Uncompahgre Valley	25	2,901	17	1,012	....	.....	13	197	55	4,110
Idaho:										
Boise	.....	.....	....	.....	....	.....	363	6,404	363	6,404
Minidoka	21	2,146	560	12,741	....	.....	290	8,533	871	23,420
Montana:										
Blackfeet	13	1,142	....	.....	....	.....	87	5,629	100	6,771
Flathead	5	345	2	78	....	.....	72	1,292	79	1,715
Fort Peck	4	112	....	.....	....	.....	13	218	17	330
Huntley	115	3,480	....	.....	....	.....	230	6,000	345	9,480
Milk River	.....	.....	....	.....	8	1,030	7	108	15	1,138
Sun River	59	1,935	....	.....	....	.....	57	1,015	116	2,950
Montana-North Dakota: Lower Yellowstone	37	3,678	....	.....	31	2,913	192	3,817	260	10,408
Nebraska-Wyoming: North Platte	32	576	78	1,422	59	1,032	49	784	218	3,814
New Mexico: Carlsbad	1	400	....	.....	....	.....	.....	.....	1	400
North Dakota:										
North Dakota Pumping, Buford Trenton unit	6	230	....	.....	....	.....	23	398	29	628
Williston unit	25	1,112	....	.....	....	.....	78	2,263	103	3,375
Oregon: Umatilla	4	130	....	.....	....	.....	.....	.....	4	130
Oregon-California: Klamath	3	410	....	.....	....	.....	8	400	11	810
South Dakota: Belle Fourche	31	2,742	15	1,526	98	4,704	10	120	154	9,092
Utah: Strawberry Valley	1	110	....	.....	....	.....	.....	.....	1	110
Washington:										
Okanogan	9	516	....	.....	....	.....	.....	.....	9	516
Sunnyside	15	1,870	....	.....	....	.....	.....	.....	15	1,870
Tieton	62	4,214	....	.....	....	.....	.....	.....	62	4,214
Wyoming: Shoshone	364	10,987	....	.....	....	.....	127	4,086	491	15,073
Total	1,130	47,897	672	16,779	196	9,679	1,853	46,080	3,851	120,435

Results of reclamation work to June 30, 1913—Continued.

Projects.	Pipe length.					Flumes.							
						Concrete.		Metal.		Wood.		Total.	
	Concrete.	Metal.	Terra cotta.	Wood.	Total.	No.	Length.	No.	Length.	No.	Length.	No.	Length.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*		*Feet.*		*Feet.*
Arizona:													
Salt River	12,000				12,000	8	240			30	1,400	38	1,640
Water users						1	595					1	595
South Side	416	140	618		1,174					1	16	1	16
Arizona-California:													
Yuma			130		130	1	30			7	500	8	530
California: Orland	2,979				2,979			2	365			2	365
Colorado:													
Grand Valley			520		520								
Uncompahgre Valley	1,292	6,910	4,008		12,210			61	7,646	36	3,157	97	10,803
Idaho:													
Boise	45,220	2,000		26,983	74,203			65	40,658	135	4,562	200	45,220
Minidoka	2,255	12,741		6,049	21,045	2	190	11	393	86	4,747	99	5,330
Montana:													
Blackfeet	2,687	1,346			4,033			2	800	3	503	5	1,303
Flathead	1,102	78			1,180					40	7,768	40	7,768
Fort Peck								3	448	1	42	4	490
Huntley	2,100	270			2,370	1	85	15	2,640	20	2,285	36	5,010
Milk River			1,030	108	1,138			4	322	9	2,122	13	2,444
Sun River	1,627	610			2,237			2	330	1	60	3	390
Montana-North Dakota: Lower Yellowstone			16,783		16,783	10	840			29	1,073	39	1,913
Nebraska-Wyoming: North Platte	529	1,984	33,716	1,752	37,981	2	466	20	5,910	2	80	24	6,456
Nevada: Truckee-Carson		500	1,400	958	2,858								
New Mexico:													
Carlsbad	1,000		432		1,432	1	497	1	40			2	537
Hondo		448			448								
North Dakota:													
North Dakota Pumping, Buford Trenton unit	2,762	434			3,196	1	42	1	296			2	338
Williston unit	2,283	326			2,609			3	296	2	213	5	509
Oregon: Umatilla	81,950		8,000	10,500	100,450			21	1,000	4	365	25	1,365
Oregon-California:													
Klamath	140	2,010	1,331		3,481			1	307	11	10,520	12	10,827
South Dakota: Belle Fourche	4,350		21,427	3,892	29,669			7	3,500	21	6,790	28	10,290
Washington:													
Okanogan		240	1,650		1,890								
Yakima storage	1,936				1,936								
Sunnyside	6,192	1,600		104,500	112,292					501	205,000	501	205,000
Tieton	246,132		3,622	29,407	279,161			16	9,551	121	67,847	137	77,398
Wyoming: Shoshone	14,260	650	86,672		101,582	1	54	3	210	111	4,590	115	4,854
Total	433,212	32,287	181,339	184,149	830,987	28	3,039	238	74,712	1,171	323,640	1,437	401,391

Results of reclamation work to June 30, 1913—Continued.

Projects.	Buildings.						Wells.		Roads, miles.	Railroads, miles.	Telephones.		Transmission lines, miles.	Horsepower developed.
	Offices.	Residences.	Power plants.	Pumping stations.	Barns, etc.	Total.	No.	Depth.			Line, miles.	No.		
Arizona:								*Feet.*						
Salt River	1	17	1	8	15	42	29	6,358	147	....	214	68	118	8,040
Water users	....	3	2	....	....	5	1	185	5	....	.....	....	12	4,020
South Side	....	....	....	1	....	1	....	.....	....	....	.....	....	3	.....
Indian project, Gila River	....	1	1	8	2	12	10	2,054	10	....	23	7	23	.....
Arizona-California: Yuma	1	1	....	2	5	9	....	.....	25	1	142	94	....	.....
California: Orland	1	1	....	....	4	6	3	200	....	....	[1]50	7	....	.....
Colorado:														
Grand Valley	....	....	....	....	1	1	....	.....	....	....	4	5	....	.....
Uncompahgre Valley	3	13	2	....	16	34	....	.....	22	7	33	23	7	.....
Idaho:														
Boise	9	42	1	....	45	97	3	500	28	19	211	138	26	3,220
Minidoka	3	8	1	11	15	38	14	857	8	....	175	90	54	9,380
Idaho-Wyoming: Snake River storage, Jackson Lake	....	....	....	....	2	6	....	.....	36	....	70	7	....	.....
Kansas: Garden City	....	1	1	23	2	27	216	8,800	....	....	5	4	5	600
Montana:														
Blackfeet	1	1	....	....	2	4	6	184	7	....	109	11	....	.....
Flathead	5	22	....	....	12	39	3	80	9	....	98	17	....	.....
Fort Peck	1	7	....	....	5	13	2	60	....	....	.....	....	....	.....
Huntley	1	11	....	1	11	24	4	625	....	....	23	9	....	286
Milk River	1	6	....	....	6	13	3	200	4	....	.....	8	....	.....
St. Mary storage	3	27	....	....	32	62	2	172	65	....	83	5	....	.....
Sun River	5	30	1	....	16	54	3	212	34	....	95	21	....	.....
Montana-North Dakota: Lower Yellowstone	4	23	....	....	18	45	7	200	11	....	80	24	....	.....
Nebraska-Wyoming: North Platte	2	6	....	....	6	14	14	1,446	....	....	186	34	....	.....
Nevada: Truckee-Carson	5	15	1	....	7	28	....	.....	52	4	128	58	16	1,730
New Mexico:														
Carlsbad	1	5	....	....	10	16	1	127	25	....	.....	....	....	.....
Hondo	....	1	....	....	....	1	1	365	....	....	15	5	....	.....
New Mexico-Texas:														
Rio Grande storage unit	1	73	1	1	34	10	1	20	19	13	21	33	7	2,000
Leasburg unit	....	2	....	....	2	4	2	28	7	....	6	2	....	.....
North Dakota:														
North Dakota Pumping, Buford-Trenton unit	1	3	....	2	2	8	1	30	....	....	29	2	29	.....
Williston unit	2	6	1	3	5	17	2	100	....	....	4	5	4	2,050
Oregon: Umatilla	1	6	....	....	6	13	4	272	7	....	.....	15	....	.....
Oregon-California: Klamath	1	6	....	....	12	19	6	690	6	....	86	44	....	.....
South Dakota: Belle Fourche	3	9	....	....	9	21	2	1,968	....	7	75	27	....	.....
Utah: Strawberry Valley	1	3	1	....	1	6	....	.....	43	....	35	16	47	1,140
Washington:														
Okanogan	1	5	....	....	4	10	....	.....	2	....	25	15	....	.....
Yakima storage	....	4	....	....	....	4	....	.....	46	....	63	22	....	.....
Sunnyside	1	19	....	....	4	24	1	120	....	....	124	40	....	.....
Tieton	2	14	....	....	3	19	....	.....	30	....	59	47	....	.....
Wyoming: Shoshone	4	31	....	1	16	52	7	384	49	....	60	24	....	.....
Total	65	426	14	61	332	898	348	26,237	697	51	2,331	927	351	32,466

[1] Leased lines.

Results of reclamation work to June 30, 1913—Continued.

Projects.	Material excavated.				Rip-rap.	Paving.	Concrete.	Cement used.	Barrels cement manufactured by United States.
	Class 1, earth.	Class 2, indurated material.	Class 3, rock.	Total.					
	Cubic yards.	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*	*Square yards.*	*Cubic yards.*	*Barrels.*	
Arizona:									
Salt River	3,113,614	1,000,431	580,354	4,694,399	7,000	4,967	334,778	411,062	338,452
Water users	314,581	18,425	106,931	439,937	.....	15,058	11,763	15,122	.....
South Side	223,496	18,284	4,468	246,248	.....	1,058	386	548	.....
Indian project, Gila River	302,285	16,261	9,452	327,998	.....	2,154	1,687	2,109	.....
Arizona-California:									
Yuma	8,035,665	372,567	828,715	9,236,947	59,699	100,163	95,730	103,555	.....
California: Orland	353,112	49,124	2,700	404,936	1,200	2,250	21,027	22,884	.....
Colorado:									
Grand Valley	6,577	1,235	29,425	37,237	.....	.....	85	127	.....
Uncompahgre Valley	1,293,203	621,106	385,021	2,299,330	3,366	1,190	83,380	77,999	.....
Idaho:									
Boise	9,449,176	1,314,384	512,891	11,276,451	16,180	3,450	135,929	111,316	[1] 71,310
Minidoka	8,635,691	201,435	413,479	9,250,605	.....	92,342	37,189	41,472	.....
Idaho-Wyoming:									
Snake River storage, Jackson Lake	183,000	.....	6,749	189,749	4,037	11,364	3,649	3,182	.....
Kansas: Garden City	66,400	.....	.....	66,400	.....	.....	5,338	7,571	.....
Montana:									
Blackfeet	1,357,736	38,168	79,817	1,475,721	550	4,250	2,888	2,781	.....
Flathead	1,928,796	100,859	25,660	2,055,315	438	12,612	4,300	5,333	.....
Fort Peck	568,000	2,201	.....	570,201	20	88	1,140	1,118	.....
Huntley	1,664,165	22,190	12,600	1,698,955	1,680	1,109	12,575	17,122	.....
Milk River	2,397,770	8,539	5,114	2,411,423	7,164	4,499	3,304	4,128	.....
St. Mary storage	406,500	4,681	51,078	462,259	.....	.....	.....	.....	.....
Sun River	737,828	23,400	42,226	803,454	7,999	714	4,457	5,288	.....
Montana-North Dakota: Lower Yellowstone	6,326,473	182,733	189,111	6,698,317	18,736	.....	22,055	27,345	.....
Nebraska-Wyoming:									
North Platte	9,919,308	578,950	201,349	10,699,607	45,022	56,406	100,100	122,698	.....
Nevada: Truckee-Carson	9,138,129	299,474	465,381	9,902,984	17,527	46,531	80,597	93,280	[1] 15,670
New Mexico:									
Carlsbad	535,665	20,880	79,290	635,835	60,590	.....	18,133	19,023	.....
Hondo	779,990	3,000	35,590	818,580	86,360	.....	3,830	2,830	.....
New Mexico-Texas:									
Rio Grande storage unit	239,160	58,210	341,100	638,470	.....	.....	37,353	34,455	[1] 8,455
Leasburg unit	302,082	1,300	570	303,952	520	.....	2,960	2,966	.....
Franklin Canal	.....	.....	.....	.....	.....	.....	225	240	.....
North Dakota: [2]									
North Dakota Pumping, Buford-Trenton unit	69,600	50	.....	69,650	.....	240	1,654	2,599	.....
Williston unit	219,100	16	.....	219,116	.....	990	2,632	3,329	.....
Oregon: Umatilla	2,390,000	111,500	44,000	2,545,500	34,600	4,200	22,750	35,125	.....
Oregon-California:									
Klamath	2,197,647	322,651	107,753	2,628,051	7 900	5,727	17,472	22,915	.....
South Dakota: Belle Fourche	6,406,350	133,390	42,120	6,581,860	1,632	68,495	52,437	68,063	.....
Utah: Strawberry Valley	753,303	69,920	185,422	1,008,645	7,483	18,215	42,891	47,500	.....
Washington:									
Okanogan	647,700	96,850	50,000	794,550	1,050	925	4,990	5,494	.....
Yakima storage	867,103	32,537	836	900,476	19,822	14,062	11,549	14,749	.....
Sunnyside	2,698,040	48,251	47,317	2,793,608	.....	8,980	17,950	19,770	.....
Tieton	759,636	470,374	257,570	1,487,580	8,423	19,087	24,562	36,708	.....
Wyoming: Shoshone	2,205,872	52,742	312,808	2,571,422	3,792	10,196	121,163	141,738	.....
Total	87,492,753	6,296,118	5,456,897	99,245,768	419,790	511,322	1,344,908	1,533,544	433,887

[1] Sand-cement.

[2] 30,000 tons of coal mined.

Government equipment, June 30, 1913, and number of employees, January 1 to June 30, 1913.

Projects.	Air compressors.	Automobiles.	Boats.	Boilers.	Cableways.	Standard-gauge cars.	Narrow-gauge cars.	Concrete cars.	Dump carts.	Other carts.	Concrete mixers.	Derricks.	Dredges.	Diamond drills.	Well drills.	Percussion drills.
Arizona: Salt River	1	8	1	2	....	8	....	....	4	6	1	3	....	....	2	....
Arizona-California: Yuma	3	2	1	19	1	109	22	....	....	2	3	16	....	....	....	....
California: Orland	....	1	1	....	....	....	4	....	....	....	1	2	1	....	....	1
Colorado:																
Grand Valley	1	1	....	3	....	....	46	....	2	....	1	1	....	....	....	18
Uncompahgre Valley	5	2	1	9	....	....	74	20	7	....	3	....	....	1	....	20
Idaho:																
Boise	2	2	9	4	5	9	110	29	20	....	11	11	....	....	3	20
Minidoka	1	2	....	3	....	....	....	....	....	....	3	3	1	1	....	1
Idaho-Wyoming: Snake River Storage	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
Kansas: Garden City	1	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....
Montana:																
Blackfeet	....	....	2	....	....	....	2	....	....	2	2	....	....	....	....	....
Flathead	....	....	2	....	....	....	6	....	6	16	3	....	....	....	....	1
Fort Peck	....	....	....	....	....	....	....	....	....	3	2	....	....	....	....	....
Huntley	....	2	....	....	....	....	....	....	2	6	....	....	....	....	....	....
Milk River	....	1	2	3	....	....	4	7	....	9	1	1	....	....	1	....
St. Mary storage unit	....	....	4	3	....	....	....	....	....	4	1	2	....	....	....	....
Sun River	1	1	1	5	....	....	25	....	5	1	....	2	6	2	....	7
Montana-North Dakota: Lower Yellowstone	1	1	2	1	1	....	12	....	....	....	1	6	....	....	....	....
Nebraska-Wyoming: North Platte	1	2	1	3	1	....	6	....	1	11	2	4	....	....	....	5
Nevada: Truckee-Carson	2	2	1	2	....	....	42	....	2	3	2	6	....	1	....	12
New Mexico:																
Carlsbad	....	1	1	....	....	....	6	....	....	....	....	....	....	....	....	....
Hondo	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New Mexico-Texas:																
Rio Grande storage unit	1	....	....	2	3	43	5	....	22	....	5	21	....	1	2	18
Leasburg unit	....	1	1	....	....	....	....	....	2	....	....	....	....	....	....	....
Other units	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Dakota: North Dakota Pumping	....	....	2	....	....	....	16	....	....	3	....	....	....	....	....	....
Oregon: Umatilla	....	....	2	....	....	....	....	....	....	6	2	7	....	....	....	....
Oregon-California: Klamath	....	2	9	1	....	....	13	....	8	....	....	3	....	....	....	4
South Dakota: Belle Fourche	1	1	....	....	....	....	36	26	....	....	....	....	....	....	....	7
Utah: Strawberry Valley	....	1	....	3	1	2	39	24	2	2	4	5	....	....	....	21
Washington:																
Okanogan	....	1	1	....	....	....	....	4	....	....	1	....	....	....	....	4
Yakima storage unit	2	1	5	6	....	....	80	4	4	....	3	4	1	....	1	10
Sunnyside unit	....	2	....	1	....	....	....	....	....	....	1	....	1	....	1	....
Tieton unit	1	1	2	1	....	....	44	....	....	....	....	....	....	....	....	....
Wyoming: Shoshone	1	1	4	2	1	....	....	19	2	18	1	....	....	1	....	4
Washington and field offices (including Oregon cooperative)	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
Total, June 30, 1913	25	42	55	73	13	171	594	133	89	92	54	97	10	8	11	154
Total, Dec. 31, 1912	24	26	50	64	12	174	657	139	92	84	52	94	8	11	10	198

Government equipment, June 30, 1913, and number of employees, January 1 to June 30, 1913—Continued.

Projects.	Electric generators.		Electric motors.		Electric-light plants.	Gasoline engines.		Steam engines.		Excavators, drag line.	Elevating graders.	Road graders.	Horses and mules.
		Kw.		*Kw.*			*H. P.*		*H. P.*				
Arizona: Salt River	4	1,325	33	667	....	6	52	6	203	1	....	1	103
Arizona-California: Yuma	3	125	4	60	2	20	597	24	920	2	....	1	81
California: Orland	....	.....	1	3	....	4	22	.....	.....	....	....	....	6
Colorado:													
Grand Valley	2	104	7	87	....	1	6	1	200	....	....	....	6
Uncompahgre Valley	6	443	10	285	2	....	.....	11	950	....	....	1	53
Idaho:													
Boise	3	1,950	61	2,800	1	9	35	1	12	2	....	5	81
Minidoka	1	10	9	72	1	5	159	1	10	2	....	....	50
Idaho-Wyoming: Snake River Storage	....	.....	....	.....	....	....	.....	....	.....	....	....	....	2
Kansas: Garden City	6	470	27	609	1	5	33	....	.....	....	....	....	.....
Montana:													
Blackfeet	....	.....	....	.....	....	1	15	2	60	....	1	1	99
Flathead	....	.....	....	.....	....	4	13	1	40	....	1	1	93
Fort Peck	....	.....	....	.....	....	....	.....	....	.....	....	....	....	27
Huntley	....	.....	....	.....	....	1	6	....	.....	1	....	2	18
Milk River	1	15	....	.....	1	....	.....	5	62	....	....	1	33
St. Mary storage unit	....	.....	....	.....	2	....	.....	4	102	1	....	1	44
Sun River	....	.....	....	.....	....	3	24	2	130	....	....	1	46
Montana-North Dakota: Lower Yellowstone	....	.....	....	.....	....	2	8	5	180	....	....	....	43
Nebraska-Wyoming: North Platte	2	55	3	17	....	9	55	9	200	2	1	1	159
Nevada: Truckee-Carson	4	1,040	25	2,265	1	5	30	3	58	1	....	2	73
New Mexico:													
Carlsbad	....	.....	....	.....	....	3	35	....	.....	....	1	1	3
Hondo	....	.....	....	.....	....	....	.....	....	.....	....	....	....	1
New Mexico-Texas:													
Rio Grande storage unit	5	1,530	67	2,238	....	6	106	4	65	....	....	....	33
Leasburg unit	....	.....	....	.....	....	1	3	....	.....	....	....	....	4
Other units	....	.....	....	.....	....	....	.....	....	.....	....	....	....	10
North Dakota: North Dakota Pumping	....	.....	....	.....	....	....	.....	1	15	....	....	....	7
Oregon: Umatilla	....	.....	....	.....	....	4	12	3	70	1	....	....	20
Oregon-California: Klamath	....	.....	....	.....	....	3	19	2	34	1	....	1	45
South Dakota: Belle Fourche	1	3	....	.....	1	3	22	1	30	....	1	....	63
Utah: Strawberry Valley	11	1,357	26	855	1	2	45	3	32	1	1	1	28
Washington:													
Okanogan	....	.....	....	.....	....	....	.....	....	.....	....	....	....	6
Yakima storage unit	4	282	18	307	2	1	18	10	200	2	....	1	146
Sunnyside unit	....	.....	1	5	1	4	40	2	45	....	....	1	2
Tieton unit	....	.....	....	.....	....	2	8	2	50	....	....	1	18
Wyoming: Shoshone	....	.....	....	.....	....	6	35	2	39	3	....	2	39
Washington and field offices (including Oregon cooperative)	....	.....	....	.....	....	1	4	....	.....	....	....	....	.....
Total, June 30, 1913	53	8,709	292	10,310	16	111	1,402	105	3,707	20	6	26	1,442
Total, Dec. 31, 1912	54	8,691	260	11,717	17	113	1,430	107	3,735	21	7	25	1,478

Government equipment, June 30, 1913, and number of employees, January 1 to June 30, 1913—Continued.

Projects.	Hydraulic rams.	Locomotives.	Motor cycles.	Pile drivers.	Plows.	Pumps.	Rock crushers.	Rollers.	Fresno scrapers.	Slip scrapers.	Wheel scrapers.	Sleighs and sleds.	Sprinklers.	Steam shovels.	Traction engines.	Dump wagons.	Heavy freight wagons.
Arizona: Salt River	...	1	18	....	36	32	1	....	115	98	6	....	....	....	....	....	3
Arizona-California: Yuma	...	3	3	1	36	50	2	....	140	12	15	....	1	2	....	4	19
California: Orland	...	....	....	1	6	7	....	....	8	8	4	....	....	....	....	....	2
Colorado:																	
Grand Valley	...	2	....	....	1	4	1	....	....	7	....	....	....	....	....	....	3
Uncompahgre Valley	...	4	2	4	13	19	1	....	27	154	37	2	....	....	....	4	14
Idaho:																	
Boise	...	8	8	2	44	52	2	....	69	114	24	13	6	2	....	....	31
Minidoka	...	....	4	1	7	2	1	....	3	12	10	1	....	....	....	....	2
Idaho-Wyoming: Snake River storage	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Kansas: Garden City	...	....	....	....	3	31	....	....	....	4	....	....	....	....	....	....	....
Montana:																	
Blackfeet	...	....	2	....	34	7	....	1	12	127	17	1	....	....	....	....	10
Flathead	1	....	1	....	28	1	....	2	47	48	20	10	....	2	1	15	27
Fort Peck	...	....	1	....	20	1	....	....	103	7	6	2	....	....	....	....	2
Huntley	...	....	....	....	10	5	....	....	2	50	10	....	....	....	....	....	3
Milk River	...	....	1	4	11	13	....	....	17	25	18	6	....	....	....	1	4
St. Mary storage unit	1	....	....	1	10	11	....	....	6	6	....	4	....	1	....	7	7
Sun River	...	2	1	1	12	6	....	1	7	24	18	7	....	1	1	24	13
Montana-North Dakota: Lower Yellowstone	...	....	....	3	12	14	....	....	13	49	14	7	....	....	....	4	8
Nebraska-Wyoming: North Platte	1	....	1	....	21	23	1	....	18	85	55	....	....	1	....	24	8
Nevada: Truckee-Carson	1	4	1	1	15	34	1	1	40	37	19	....	....	3	2	35	19
New Mexico:																	
Carlsbad	1	....	....	....	7	2	....	1	11	36	25	....	1	....	....	15	3
Hondo	...	....	....	....	....	1	....	....	....	5	....	....	....	....	....	....	....
New Mexico-Texas: Rio Grande storage unit	...	4	....	....	....	26	5	....	6	16	....	....	1	....	....	2	16
Leasburg unit	...	....	....	....	3	4	....	....	2	....	....	....	....	....	....	....	....
Other units	...	....	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....
North Dakota: North Dakota Pumping	...	....	....	....	2	2	....	....	1	4	....	....	....	....	....	....	....
Oregon: Umatilla	...	....	....	....	4	15	....	....	8	14	3	1	....	....	....	....	7
Oregon-California: Klamath	1	....	2	....	19	6	1	1	27	22	19	2	....	....	....	1	14
South Dakota: Belle Fourche	...	2	....	....	14	5	....	....	17	46	24	....	....	1	1	13	6
Utah: Strawberry Valley	...	4	....	1	21	24	2	....	19	70	12	13	....	....	....	13	2
Washington:																	
Okanogan	1	....	....	2	3	....	1	....	2	12	8	1	....	....	....	....	....
Yakima storage unit	....	4	....	....	11	11	2	1	24	47	....	10	....	1	1	7	15
Sunnyside unit	1	....	....	1	9	3	....	....	15	25	11	....	....	....	....	....	1
Tieton unit	...	....	1	....	5	4	....	....	4	6	3	2	....	....	....	....	5
Wyoming: Shoshone	2	....	1	....	19	18	....	....	19	39	10	....	....	....	....	....	....
Washington and field offices (including Oregon cooperative)	...	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Total, June 30, 1913	10	38	50	23	437	434	21	8	782	1,209	388	82	9	14	6	169	245
Total, Dec. 31, 1912	9	38	27	22	408	418	20	8	772	1,287	422	73	6	14	4	177	233

Government equipment, June 30, 1913, and number of employees, January 1 to June 30, 1913—Continued.

Projects.	Light freight wagons.	Spring wagons.	Average force (January to June).					Maximum force.					Average all employees, June, 1913.
			Government.			Contractors.	Grand total.	Government.			Contractors.	Grand total.	
			Classified.	Others.	Total.			Classified.	Others.	Total.			
Arizona: Salt River	84	17	100	400	500	15	515	120	500	620	95	715	664
Arizona-California: Yuma	10	6	75	293	368	....	368	75	300	375	.....	375	368
California: Orland	3	4	11	19	30	....	30	14	36	50	.....	50	18
Colorado:													
Grand Valley	....	4	27	108	135	....	135	33	189	222	.....	222	209
Uncompahgre Valley	....	7	67	193	260	80	340	75	220	295	90	385	340
Idaho:													
Boise	3	22	250	422	672	....	672	261	667	928	.....	928	724
Minidoka	8	19	106	265	371	....	371	140	468	608	.....	608	383
Idaho-Wyoming: Snake River Storage	1	2	2	7	9	....	9	16	109	125	.....	125	56
Kansas: Garden City	....	....	.....	1	1	....	1	.....	1	1	.....	1	1
Montana:													
Blackfeet	14	7	17	134	151	....	151	22	355	377	.....	377	377
Flathead	6	6	28	100	128	57	185	33	126	159	63	222	160
Fort Peck	7	3	8	107	115	....	115	14	286	300	.....	300	266
Huntley	3	5	18	115	133	....	133	22	195	217	.....	217	100
Milk River	12	3	43	55	98	210	308	49	100	149	391	540	513
St. Mary storage unit	4	4	11	60	71	1	72	27	145	172	13	185	179
Sun River	8	8	34	145	179	12	191	37	226	263	15	278	168
Montana-North Dakota: Lower Yellowstone	4	5	15	37	52	38	90	17	103	120	47	167	100
Nebraska-Wyoming: North Platte	46	25	82	111	193	155	348	115	174	289	230	519	413
Nevada: Truckee-Carson	7	6	73	198	271	....	271	77	203	280	.....	280	261
New Mexico:													
Carlsbad	....	....	12	80	92	7	99	13	222	235	30	265	57
Hondo	1	....	1	5	6	....	6	3	30	33	.....	33	6
New Mexico-Texas:													
Rio Grande storage unit	4	5	40	458	498	....	498	49	496	545	.....	545	526
Leasburg unit	2	2	2	5	7	....	7	2	10	12	.....	12	102
Other units	....	6	41	74	115	....	115	48	92	140	.....	140	
North Dakota: North Dakota Pumping	2	4	10	20	30	....	30	11	68	79	.....	79	68
Oregon: Umatilla	1	3	25	41	66	....	66	33	72	105	.....	105	47
Oregon-California: Klamath	8	10	23	60	83	60	143	23	66	89	74	163	163
South Dakota: Belle Fourche	16	10	22	17	39	20	59	38	64	102	25	127	127
Utah: Strawberry Valley	10	9	16	25	41	....	41	37	155	192	.....	192	192
Washington:													
Okanogan	1	3	7	20	27	....	27	12	50	62	.....	62	20
Yakima storage unit	4	4	41	149	190	....	190	91	436	527	.....	527	527
Sunnyside unit	7	....	42	15	57	....	57	50	60	110	.....	110	57
Tieton unit	5	7	34	36	70	....	70	35	62	97	.....	97	69
Wyoming: Shoshone	17	9	36	151	187	....	187	48	309	357	.....	357	167
Washington and field offices (including Oregon cooperative)	....	....	160	10	170	....	170	170	18	188	.....	188	188
Total, June 30, 1913	298	225	1,479	3,936	5,415	655	6,070	1,810	6,613	8,423	1,073	9,496	7,616
Total, Dec. 31, 1912	303	202	1,608	4,684	6,292	595	6,887	1,824	6,473	8,297	825	9,122	5,346

Summary of operation and maintenance results for 1912.

Projects.	Irrigable.	Irrigated.		Farms irrigated and cropped.	Number of water-right applications.	Miles of canals operated.	Operation.		
		Under water-right applications.	Under rental contracts, etc.				Total.	Per acre irrigable.	Per mile canal.
	Acres.	*Acres.*	*Acres.*						
Arizona, Salt River	160,000	.....	159,170	3,600	.....	576	$65,301	$0.41	$113
Arizona-California, Yuma	38,500	3,510	10,257	470	173	171	32,987	.85	193
California, Orland	14,200	.....	4,230	211	.....	88	6,417	.45	73
Colorado, Uncompahgre Valley	43,450	.....	48,023	1,245	.....	211	15,989	.37	76
Idaho:									
Boise	200,000	.....	61,725	1,575	.....	966	45,215	.23	47
Minidoka gravity	62,000	40,615	.....	1,110	1,118	146	16,758	.27	115
Minidoka pumping	47,300	.....	29,623	496	.....	236	35,146	.75	149
Montana:									
Flathead	35,000	.....	4,203	111	.....	103	5,359	.15	52
Huntley	28,805	14,425	.....	489	538	194	7,169	.25	37
Milk River	7,800	.....	352	28	.....	30	1,256	.16	42
Sun River	16,346	6,700	124	180	177	120	2,547	.16	21
Montana-North Dakota, Lower Yellowstone	37,625	5,068	.....	287	347	126	5,458	.15	43
Nebraska-Wyoming, North Platte	103,658	49,068	6,563	885	854	647	40,624	.17	67
Nevada, Truckee-Carson	52,039	11,294	25,326	497	398	294	15,366	.17	52
New Mexico:									
Carlsbad	20,277	13,409	50	345	521	45	6,726	.33	149
Hondo	10,000	.....	1,261	26	.....	13	2,706	.27	216
New Mexico-Texas, Rio Grande, Leasburg Unit	25,000	.....	23,115	890	.....	6	5,587	.22	931
North Dakota, North Dakota Pumping:									
Buford-Trenton Unit	4,050	.....	.....	31	27	.....	5,072	1.29	.....
Williston Unit	8,190	323	.....	93	102	18	6,745	.82	367
Oregon, Umatilla	17,252	4,482	118	295	504	97	9,824	.56	101
Oregon-California, Klamath	30,093	21,981	1,853	405	430	132	6,462	.21	49
South Dakota, Belle Fourche	65,868	27,831	66	537	618	448	10,206	.15	23
Washington:									
Okanogan	9,900	5,711	1,549	432	430	46	7,402	.74	161
Yakima-Sunnyside	80,076	17,140	38,660	2,441	2,441	500	34,019	.42	68
Yakima-Tieton	34,613	15,008	.....	716	875	260	18,040	.52	69
Wyoming, Shoshone	41,332	16,524	.....	353	391	271	16,576	.40	61
Total	.....	.....	416,268	17,748	.....	.....	.....	.....	.....
Deductions[1]	.....	.....	27,961	1,194	.....	.....	.....	.....	.....
Total	1,193,374	253,090	388,307	16,554	9,952	5,744	424,957	.35	74

[1] In order to make table comparable with report for 1911.

Summary of operation and maintenance results for 1912—Continued.

Projects.	Maintenance.						Operation and maintenance.		
	Upkeep.			Drainage, etc.			Total.	Per acre irrigable.	Per mile canal.
	Total.	Per acre irrigable.	Per mile canal.	Total.	Per acre irrigable.	Per mile canal.			
Arizona, Salt River	$126,200	$0.79	$219	.....	.....	.....	$191,501	$1.20	$332
Arizona-California, Yuma	67,729	1.76	395	.....	.....	.....	100,716	2.61	588
California, Orland	6,726	.47	76	.....	.....	.....	13,143	.92	149
Colorado, Uncompahgre Valley	36,348	.83	172	$18,865	$0.44	$90	71,202	1.64	338
Idaho:									
Boise	32,093	.16	33	11,167	.05	12	88,475	.44	92
Minidoka gravity	18,366	.30	126	130,997	2.15	895	166,121	2.72	1,136
Minidoka pumping	29,612	.63	125	.....	.....	.....	64,758	1.38	274
Montana:									
Flathead	2,511	.07	24	639	.02	6	8,509	.24	82
Huntley	20,976	.73	108	31,672	1.10	163	59,817	2.08	308
Milk River	4,638	.60	154	11,064	1.42	369	16,958	2.18	565
Sun River	5,900	.36	49	1,316	.08	11	9,763	.60	81
Montana-North Dakota, Lower Yellowstone	92,952	2.47	741	29,990	.79	239	128,400	3.41	1,023
Nebraska-Wyoming, North Platte	30,700	.36	51	5,656	.07	9	76,980	.90	127
Nevada, Truckee-Carson	29,212	.32	99	1,014	.01	4	45,592	.50	155
New Mexico:									
Carlsbad	13,443	.66	299	.....	.....	.....	20,169	.99	448
Hondo	1,110	.11	89	270	.03	22	4,086	.41	327
New Mexico-Texas, Rio Grande, Leasburg Unit	1,043	.04	174	880	.04	147	7,510	.30	1,252
North Dakota, North Dakota Pumping:									
Buford-Trenton Unit	8,417	2.15	.....	.....	.....	.....	13,489	3.44	.....
Williston Unit	12,483	1.52	678	16,934	2.07	920	36,162	4.41	1,965
Oregon, Umatilla	13,302	.77	137	4,014	.23	41	27,140	1.56	279
Oregon-California, Klamath	7,576	.25	57	6,580	.22	50	20,618	.68	156
South Dakota, Belle Fourche	23,449	.36	52	25,256	.38	56	58,911	.89	131
Washington:									
Okanogan	5,351	.53	116	845	.08	18	13,598	1.35	295
Yakima-Sunnyside	52,461	.66	105	.....	.....	.....	86,480	1.08	173
Yakima-Tieton	21,565	.62	83	.....	.....	.....	39,605	1.14	152
Wyoming, Shoshone	7,085	.17	26	120,427	2.91	444	144,088	3.48	531
Total	671,248	.56	117	417,586	.35	73	1,513,791	1.26	263

Summary of operation and maintenance results for 1912—Continued.

Projects.	Value of crops.			Population.		Water delivered to land.	
	Total.	Per acre irrigated.	Per acre cropped.	On farms.	In towns.	Total.	Per acre irrigated.
						Acre-feet.	*Acre-feet.*
Arizona, Salt River	$4,775,000	$30.00	$30.65	25,000	25,000	561,000	3.52
Arizona-California, Yuma	497,013	36.10	45.00	1,490	3,150	63,273	4.58
California, Orland	112,924	26.70	30.50	645	1,200	16,702	3.97
Colorado, Uncompahgre Valley	1,553,513	32.35	32.85	5,171	6,320	133,912	4.81
Idaho:							
Boise	979,602	15.90	17.30	6,350	30,000	119,248	1.93
Minidoka gravity	464,036	11.40	13.10	4,800	2,200	304,172	4.33
Minidoka pumping	386,718	13.05	15.00	.....	.....	.....	.....
Montana:							
Flathead	64,846	15.42	15.72	327	3,225	8,345	1.98
Huntley	360,071	25.00	27.10	1,500	270	21,437	1.50
Milk River	43,305	9.08	14.35	74	900	293	.82
Sun River	84,092	12.32	12.32	710	323	11,688	1.71
Montana-North Dakota, Lower Yellowstone	199,530	9.50	11.40	1,200	800	6,030	1.91
Nebraska-Wyoming, North Platte	568,204	10.20	11.00	2,754	4,697	143,045	2.25
Nevada, Truckee-Carson	469,882	12.83	12.83	1,697	1,400	62,707	2.50
New Mexico:							
Carlsbad	209,000	15.52	17.97	650	2,700	38,764	2.90
Hondo	22,991	18.22	19.73	85	7,000	1,640	1.30
New Mexico-Texas, Rio Grande, Leasburg Unit	710,674	30.70	30.70	2,600	500	140,308	6.07
North Dakota, North Dakota Pumping:							
Buford-Trenton Unit	26,984	.....	14.97	53	350	.....	.....
Williston Unit	66,382	.....	16.04	172	4,700	278	.86
Oregon, Umatilla	77,219	16.77	24.00	639	600	37,950	8.25
Oregon-California, Klamath	385,065	16.16	16.16	1,028	5,287	26,929	1.13
South Dakota, Belle Fourche	308,602	11.05	11.09	1,800	5,500	30,390	1.09
Washington:							
Okanogan	120,000	16.33	36.60	1,200	1,200	9,040	1.24
Yakima-Sunnyside	3,158,857	56.30	69.50	7,322	6,880	192,983	3.07
Yakima-Tieton	272,070	18.10	28.00	1,174	14,500	34,445	2.27
Wyoming, Shoshone	155,400	9.00	10.07	1,700	500	27,370	1.65
Total	16,071,980	.....	.....	.....	.....	.....	.....
Deductions [1]	1,592,612	.....	.....	.....	.....	.....	.....
Total	14,479,368	22.60	25.00	70,141	129,202	1,991,949	3.2

[1] In order to make table comparable with report for 1911.

ENGINEERING DATA FOR COMPLETE PROJECTS.

TABLE 1.—*Reservoirs.*

Projects.	Name.	Area.	Capacity.	Spillways.	
				Length.	Elevation above stream bed.
		Acres.	*Acre-feet.*	*Feet.*	*Feet.*
Arizona: Salt River	Roosevelt	16,329	1,284,000	400	220
Arizona-California: Yuma	Laguna diversion	6,400			
California: Orland	East Park	1,800	45,600	415	85
Colorado: Uncompahgre Valley	Taylor Park	2,260	106,000	125	150
Idaho:					
Boise	Deer Flat	9,835	177,640	None.	
Do	Arrowrock	2,780	230,000	400	256
Minidoka	Lake Walcott	11,350	150,000	2,385	42
Do	Jackson Lake	22,600	380,000	160	24
Montana:					
Blackfeet	Two Medicine Lake	854	16,000	56	25½
Do	Spring Lake	1,400	29,000	50	45
Do	Four Horns	1,867	60,640	50	57
Flathead	Big Draw	901	9,330	100	25
Do	Dog Lake	160	3,200		30
Do	Dry Fork	250	1,918	100	25
Do	Flathead Lake	107,000	1,800,000	1,000	180
Do	Hubbart	480	20,000	50	108
Do	Kickinghorse	675	6,800		23
Do	Little Bitter Root Lake.	3,000	6,000	20	3
Do	Lower Crow Creek	300	9,485	100	82
Do	McConnell	100	2,000		40
Do	McDonald Lake	220	10,600	200	51
Do	Mission	300	8,300	100	74
Do	Ninepipe	1,630	15,100		30
Do	Pablo	2,100	29,600		36
Do	Polson	70	1,700		80
Do	St. Marys Lake	300	25,000	50	52
Do	Twin	70	937		25
Fort Peck	Little Porcupine	390	3,900		
Do	Wolf Creek	4,550			
Do	Smoke Creek	5,300			
Huntley	Highline		853		
Milk River	St. Marys Lakes	6,910	218,000	500	40
Do	Sherburne Lakes	2,000	100,000		
Do	Red Eagle Lakes		5,000		
Do	Nelson Reservoir	6,380	141,815	None.	None.
Sun River	Willow Creek	2,696	86,000	200	100
Do	Sun River storage	3,540	269,000	580	321
Do	Pishkun	1,542	45,700		
Do	Muddy Creek	1,828	33,000		
Do	Benton Lake	9,300	144,000		
Nebraska-Wyoming:					
North Platte	Pathfinder	22,700	1,070,000	660	184
Do	Reservoir No. 1, Lake Alice.	900	11,400	100	18
Do	Lake Minitare	2,240	67,025	100	55
Nevada:					
Truckee-Carson	Lake Tahoe	125,000	750,000	85	6
Do	Alkali Flat	8,500	88,000		
Do	Lahontan	11,000	290,000	500	112
New Mexico:					
Carlsbad	Avalon	970	7,000	1,000	21
Do	McMillan	6,250	70,000	2,700	23 to 26
Hondo	Hondo	1,910	40,000	None.	
N. Mex.-Tex.: Rio Grande	Elephant Butte	40,080	2,627,700	300	193
Oregon: Umatilla	Cold Springs	1,500	50,000	330	90
Oregon-California:					
Klamath	Upper Klamath Lake	60,000	200,000		
Do	Clear Lake	25,000	462,000	357	24
South Dakota: Belle Fourche	Belle Fourche	8,010	203,770	314	100
Utah: Strawberry Valley	Strawberry Valley	8,200	278,000	60	60
Washington:					
Okanogan	Salmon Lake	200	2,600	None.	
Do	Conconully	460	13,000	180	56
Yakima	Bumping Lake	1,350	34,000	235	40
Do	Lake Clealum	4,680	490,000	660	116
Do	Lake Kachess	4,800	210,000	250	53
Do	McAllister Meadow	1,800	183,000	225	186
Do	Lake Keechelus	2,550	174,000	300	60
Wyoming:					
Shoshone	Shoshone	6,600	456,000	300	233
Do	Ralston	200	2,100	None.	
Total		584,367	13,255,713		

ENGINEERING DATA FOR COMPLETE PROJECTS—Continued.

TABLE 2.—*Storage dams.*

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Arizona: Salt River.	Roosevelt [1]	Rubble masonry, arch gravity.	280	1,125	342,000
California: Orland	East Park [1]	Concrete, arch gravity	139	250	12,200
Colorado:					
Uncompahgre Valley.	Taylor Park	Undetermined	200	(2)	(2)
Idaho:					
Boise	Upper Deer Flat [1]	Earth fill	70	4,000	1,170,200
Do	Lower Deer Flat [1]	do	40	7,200	1,130,800
Do	Deer Flat Forest [1]	do	16	950	22,500
Do	Arrowrock	Rubble, concrete arch	350	1,075	530,000
Minidoka	Minidoka [1]	Rockfill, concrete core	86	937	242,500
Do	Jackson Lake	Reinforced concrete piers and radial gates and earth fill.	40	3,256	66,994
Montana:					
Blackfeet	Two Medicine	Earth, embankment	36	900	
Do	Spring Lake	do	50	1,500	75,000
Do	Four Horns	do	62	2,225	149,000
Flathead	Big Draw	Earth	35	3,600	137,000
Do	Dog Lake	Loose rock and earth	35	2,250	67,000
Do	Dry Fork	Earth	33	1,860	130,000
Do	Newell	Concrete	170	850	100,000
Do	Hubbart	Loose rock and earth	118	450	302,000
Do	Kickinghorse	Earth	31	3,700	181,000
Do	Little Bitter Root Lake.	do	10	300	4,000
Do	Little Crow Creek	do	92	860	330,000
Do	McConnell	do	45	1,130	71,000
Do	McDonald Lake	Loose rock and earth	57	1,500	214,000
Do	Mission	do	80	2,500	346,000
Do	Ninepipe [1]	Earth	38	2,180	162,000
Do	Pablo	do	46	14,000	1,028,000
Do	Polson	do	85	1,100	170,000
Do	St. Marys Lake	Loose rock and earth	58	2,200	140,000
Do	Twin	Earth	30	1,600	46,000
Fort Peck	Little Porcupine [1]	Earth and brush mattress			43,400
Do	Wolf Creek	Earth fill			85,300
Do	Smoke Creek	do			75,600
Huntley	Highline	do	53	1,330	151,350
Milk River	St. Mary Lakes	Earth embankment	45	2,600	135,000
Do	Sherburne Lakes	do	95	900	300,000
Do	Red Eagle Lake	Rubble masonry	(2)	(2)	(2)
Do	Nelson Reservoir	Earth embankment	33	15,135	911,540
Do	Willow Creek [1]	Earth fill	110	1,045	452,000
Do	Sun River storage	Masonry	329	989	296,500
Sun River	Pishkun	Earth fill	48	3,500	444,000
Do	Benton Lake	do	35	120	12,000
Nebraska-Wyoming:					
North Platte	Pathfinder [1]	Broken range masonry arch	218	432	60,210
Do	Pathfinder Dike [1]	Earth fill	40	1,650	152,000
Do	Dam No. 1 [1]	do	30	3,100	240,000
Do	Dam No. 1½ [1]	do	23	2,550	119,000
Do	Minitare	do	65	3,600	570,000
Nevada:					
Truckee-Carson	Lake Tahoe	Concrete sluiceway regulator	14	109	425
Do	Alkali Flat	Not designed			
Do	Lahontan	Earth and gravel fill	124	1,600	770,000
New Mexico:					
Carlsbad	Avalon [1]	Earth and rock fill, concrete core.	50	1,380	175,073
Do	McMillan [1]	Earth and rock fill	55	1,686	149,600
Hondo	Hondo [1]	6-earth embankments	25	16,200	421,350
New Mexico-Texas:					
Rio Grande	Elephant Butte	Rubble concrete, gravity structure, straight.	290	1,200	500,000
Do	Elephant Butte Dike	Earth fill	42	1,875	
Oregon: Umatilla	Cold Springs [1]	do	98	3,800	789,500
Oregon-California: Klamath.	Clear Lake [1]	Rock fill	33	790	56,600
South Dakota: Belle Fourche.	Belle Fourche	Earth fill	115	6,200	1,600,000
Utah: Strawberry Valley.	Strawberry	Earth fill, reinforced concrete core.	72	488	108,415

[1] Completed. [2] Not designed.

ENGINEERING DATA FOR COMPLETE PROJECTS—Continued.

TABLE 2.—*Storage dams*—Continued.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
Washington:			*Feet.*	*Feet.*	*Cubic yds.*
Okanogan	Salmon Lake[1]	Concrete headworks			
Do	Conconully[1]	Hydraulic earth fill	64	1,000	336,000
Yakima	Bumping Lake[1]	Earth fill	45	3,425	233,852
Do	Lake Clealum	do	125	1,150	617,000
Do	Lake Kachess[1]	Earth and gravel fill	60	1,400	182,150
Do	McAlister	Earth and rock fill	200	950	1,200,000
Do	Lake Keechelus	Earth fill	68	6,400	550,000
Wyoming:					
Shoshone	Shoshone[1]	Rubble, concrete arch	328	200	75,576
Do	Rolston	Earth fill	50	150	24,740
Total					19,007,375

[1] Completed. [2] Not designed.

ENGINEERING DATA FOR COMPLETE PROJECTS—Continued.

TABLE 3.—*Diversion dams.*

Projects.	Name.	Type.	Maximum height.	Length, weir.	Volume
			Feet.	*Feet.*	*Cu. yds.*
Arizona:					
Salt River	Granite Reef [1]	Rubble concrete weir	38	1,000	40,000
Do	Power Canal [1]	do	12¾	400	4,800
Do	Joint Head	Concrete weir	10	600	1,450
Arizona-California: Yuma	Laguna [1]	Indian weir, concrete and rock fill.	40	4,780	441,732
California:					
Orland	Miller Buttes [1]	Concrete on sheet piling	20	900	550
Do	North Side diversion	Concrete weir, with removable timber crest.	8	360	250
Colorado:					
Grand Valley	Diversion	Masonry ogee weir with rolling crest 10 feet high.	22	420	18,000
Uncompahgre Valley	Gunnison [1]	Crib and rock fill			3,200
Do	Uncompahgre [1]	6-pile and timber weirs			
Idaho:					
Boise	Boise River [1]	Rubble concrete weir	45	246	21,750
Minidoka	Minidoka [1]	Combined diversion and storage dam.			
Montana:					
Blackfeet	Two Medicine	Brush and rock	4	165	
Do	Badger, Birch, and Cut Bank.	Birch and Cut Bank dams not designed.			
Flathead	Jocko River	Log crib, rock filled (not designed).			
Do	Little Bitter Root River.				
Do	Mud Creek				
Do	Crow Creek				
Do	Post Creek				
Do	Mission Creek				
Do	Dry Creek				
Do	Finley Creek				
Do	Agency Creek				
Do	Big Knife Creek				
Do	Valley Creek and others.				
Fort Peck	Little Porcupine	Concrete weir on timber crib	4	150	
Do	Poplar River	do	4	300	
Do	Big Porcupine	Not determined			
Milk River	Swift Current	Earth and timber crib	13	2,800	
Do	Chinook	Timber crib, rock filled			
Do	Dodson	do	25	319	
Do	Vandalia	Reinforced concrete	34	350	
Sun River	Sun River	Concrete masonry	1[illegible]0	190	3,300
Do	Deep Creek	Reinforced concrete weir	12	100	500
Montana-North Dakota: Lower Yellowstone.	Lower Yellowstone	Rock filled, timber weir	12	700	14,000
Nebraska-Wyoming: North Platte.	Whalan	Concrete weir	29	300	80,740
Nevada:					
Truckee Carson	Truckee River [1]	Concrete sluiceways	22	171	
Do	Carson River [1]	do	21	240	
Do		Others not designed			
New Mexico:					
Carlsbad	Avalon [1]	Combined storage and diversion dam			
Hondo	Hondo River [1]	Earth fill	20	100	3,700
New Mexico-Texas: Rio Grande.	Leasburg [1]	Rubble, concrete weir	9	600	
Oregon: Umatilla	Diversion [1]	Concrete weir	2½	400	296
Oregon-California: Klamath.	Lost River [1]	Hollow reinforced concrete	40	290	5,550
South Dakota: Belle Fourche.	Diversion	Concrete weir	23	400	12,149
Utah: Strawberry Valley	Spanish Fork	Reinforced concrete weir	16	70	1,261
Washington:					
Okanogan	Salmon Creek [1]	Concrete weir	4	50	131
Yakima	Sunnyside [1]	Concrete ogee weir	8½	500	
Do	Tieton [1]	Concrete and rock fill crib	3	110	
Wyoming: Shoshone	Corbett [1]	Reinforced concrete weir	18	400	4,951
Total					658,310

[1] Completed.

ENGINEERING DATA FOR COMPLETE PROJECTS—Continued.

TABLE 4.—*Canals.*

Projects.	Principal canal.		Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Over 800.	301–800.	50–300.	Less than 50.	Total.
		Sec.ft.					
Arizona:							
Salt River	Power[1]	225					
Do	Arizona[1]	2,000	32	70	108	531	741
Do	South[1]	1,600					
Arizona-California: Yuma	Main[1]	1,700	17	17	110	260	404
California:							
Orland	South Side[1]						
Do	North Side				24	75	99
Colorado:							
Grand Valley	Main	1,425	5	38	21	5	69
Uncompahgre Valley	South[1]	1,300					
Do	Montrose & Delta	450	12	28	100	200	340
Do	Loutsenhizer	290					
Idaho:							
Boise	Main[1]	2,500	40	57	165	766	1,028
Minidoka	North Side[1]	1,400	12	32	106	650	800
Do	South Side[1]	650					
Kansas: Garden City	Main	115			2	2	4
Montana:							
Blackfeet				40	144	600	784
Flathead				14	82	800	896
Fort Peck—							
Little Porcupine Unit					1	13	14
Poplar River Unit	"B" and "C" canals				29	70	99
Big Porcupine Unit					7		7
Big Muddy Unit							
Missouri River Unit		627		10	30	60	100
Galpin Bottom Pumping Unit.							
Milk River Pumping Unit							
Huntley	Main	500		10	19	274	303
Milk River	St. Mary	850	29				29
Do	Dodson South	900	44		110	190	344
Do	Dodson North				41	60	101
Do	Glasgow Division						
Sun River	Fort Shaw	175		240	110	140	490
Montana-North Dakota: Lower Yellowstone.	Main[1]	830		49	19	190	258
Nebraska-Wyoming: North Platte	Interstate[1]	1,400	90	10	89	586	775
Nevada: Truckee-Carson	Truckee[1]	1,500	42	62	80	509	693
New Mexico:							
Carlsbad	Main[1]	450		13	12	120	145
Hondo	Main Inlet[1]	2,900		3	2	45	50
New Mexico-Texas:							
Rio Grande	Leasburg[1]	520		6			6
Do	Franklin	175			50		50
North Dakota:							
North Dakota Pumping	Buford-Trenton				6	39	45
Do	Williston				3	58	61
Oregon: Umatilla	Feed[1]	300		25	25	70	120
Oregon-California:							
Klamath	Main[1]	1,500	9	1	58	214	282
Do	Keno[1]	635					
South Dakota: Belle Fourche	Inlet[1]	1,600	7	55	105	460	627
Utah: Strawberry Valley	Power[1]	500		5	40	100	145
Washington:							
Okanogan	Main[1]	100			10	38	48
Yakima	Sunnyside[1]	1,075	31	19	33	451	534
Do	Tieton[1]	300		12	32	194	238
Wyoming: Shoshone	Garland[1]	1,000	10	33	77	397	517
Total			380	849	1,850	8,167	11,246

[1] Completed.

ENGINEERING DATA FOR COMPLETE PROJECTS—Continued.

TABLE 5.—*Tunnels.*

Project.	Name.	Length.
		Feet.
Arizona: Salt River.	Power Canal:	
	Intake	1,695
	Lee	122
	Wehri cut-off,1	428
	Wehri cut-off,2	129
	Wehri cut-off,3	271
	Wehri	151
	Pinto	999
	Chilton	1,027
	Robinson	152
	Gray	761
	Moffet	214
	Grapevine	872
	No. 6	206
	No. 7	342
	No. 8	553
	No. 9	320
	No. 10	489
	No. 11	625
	No. 12	70
	No. 13	110
	Roosevelt:	
	Sluicing	480
	Outlet	167
	Penstock	620
Arizona-California: Yuma.	Colorado River siphon.	930
Colorado:		
Grand Valley	Main Canal, No. 1.	3,723
	Main Canal, No. 2.	1,655
	Main Canal, No. 3.	7,280
Uncompahgre	Gunnison	30,645
	South Canal, No. 1.	482
	South Canal, No. 2.	395
	South Canal, No. 3.	1,000
	South Canal, No. 4.	400
	South Canal, No. 5.	390
	West Canal	1,750
	West Canal Exten.	800
	Selig Extension, No. 1.	160
	Selig Extension, No. 2.	360
	Selig Extension, No. 3.	100
	Selig Extension, No. 4.	310
Idaho: Boise	Arrowrock	487
Montana:		
Flathead	Newell	1,800
	St. Mary Lake outlet.	1,620
Huntley	Main Canal, No. 1.	724
	Main Canal, No. 2.	1,545
	Main Canal, No. 3.	385
Sun River	Willow Creek	584
	Sun River Storage Reservation.	200
	Pishkun Canal No. 1.	690
	Pishkun Canal No. 2.	980
	Pishkun Canal No. 3.	2,235
	Muddy Creek Reservoir.	700
Nebraska-Wyoming: North Platte.	Pathfinder, North.	480
	Pathfinder, South.	360
	Pathfinder, Drainage.	155
	Pathfinder, Auxiliary.	209
	Pathfinder, Crosscut.	55
Nevada: Truckee-Carson.	Main Canal, No. 1.	901
	Main Canal, No. 2.	309
	Main Canal, No. 3.	1,515
	Gilpin Spillway	115
New Mexico: Carlsbad.	Spillway, No. 1	97
	Spillway, No. 2	103
Oregon: Umatilla	Reservoir outlet	34
Oregon-California: Klamath.	Main Canal	3,300
South Dakota: Belle Fourche.	South Canal	1,307
Utah: Strawberry Valley.	Strawberry Valley	19,897
	Strawberry Dam	532
	Power Canal, No. 1	800
	Power Canal, No. 2	705
	Aqueduct	750
Washington:		
Okanogan	Conconully outlet.	395
North Yakima, Tieton.	Steeple, No. 1	55
	Steeple, No. 2	48
	Trail Creek	3,120
	Columnar	1,200
	Tieton	2,729
	North Fork	3,811
Wyoming-Shoshone.	Dam: Lower outlet	498
	Spillway	405
	Upper outlet	315
	Corbett	17,355
	Ralston reservoir	245
	Shoshone Road, No. 1.	39
	Shoshone Road, No. 2.	45
	Shoshone Road, No. 3.	14
	Shoshone Road, No. 4.	28
	Shoshone Road, No. 5.	136
	Shoshone Road, No. 6.	166
	High Line Canal, No. 1.	4,915
	High Line Canal, No. 2.	2,100
	High Line Canal, No. 3.	1,275
	High Line Canal, No. 4.	2,116
	High Line Canal, No. 5.	350
	High Line Canal, No. 6.	310
	High Line Canal, No. 7.	300
	High Line Canal, No. 8.	533
	High Line Canal, No. 9.	285
	High Line Canal, No. 10.	120
	High Line Canal, No. 11.	1,050
	Willwood, No. 1	560
	Willwood, No. 2	365
Total		[1] 149,640

[1] Total completed and prepared.

TABLE 6.—*Power development.*[1]

(Water power unless otherwise stated.)

Projects.	Name of plant.	Maximum head.	Brief description as built.	Horsepower.	
				Developed June 30, 1913.[2]	Total proposed.
Arizona, Salt River	Roosevelt	226	Three 1,260-horsepower and two 1,800-horsepower turbines; five 900-kilowatt generators.	[3] 8,040	14,700
	South Consolidated	30	Two 1,500-horsepower turbines direct connected; two 1,000-kilowatt generators.	[3] 2,680	2,680
	Arizona Falls	18	Two 825-horsepower turbines direct connected; two 525-kilowatt generators.	[3] 1,340	1,400
	Cross-cut	117	Six 1,000-horsepower vertical tangential wheels; six 875-kilowatt generators.		7,040
Arizona-California, Yuma	Drop in main canal				1,000
California, Orland					600
Colorado, Grand Valley					2,000
Colorado, Uncompahgre Valley					10,000
Idaho:					
Boise	Boise Dam	30	Three 850-horsepower turbines, direct connected, three 500-kilowatt generators.	3,220	3,220
Minidoka	Minidoka Dam	46	Five 2,000-horsepower turbines, direct connected to five 1,200 kilowatt generators.	9,380	9,380
Kansas, Garden City	Deerfield (steam)		Two 350-horsepower steam turbines and two 225-kilowatt generators	600	600
Montana:					
Flathead			Possible development from mountain streams		300,000
Huntley	Main canal drop	34	Two vertical turbines, direct connected to two 20-inch centrifugal pumps, capacity each 28 second-feet.	286	600
Montana-North Dakota: Lower Yellowstone.	Lateral K K drop				290
Nevada, Truckee-Carson	Lahontan Dam, etc	115	Two 500-kilowatt generators	[3] 1,730	8,000
New Mexico-Texas: Rio Grande	Elephant Butte (steam)		Three 500-kilowatt steam turbine units	2,000	2,000
North Dakota-North Dakota: Pumping	Williston (steam)		Two 300-kilowatt and one 500-kilowatt generators	[3] 2,050	3,000
Oregon: Umatilla	Drainage outfall				75
Utah, Strawberry Valley	Spanish Fork	125	Two horizontal 30-inch turbines and two 425-kilowatt generators	[3] 1,140	3,500
Washington, Yakima:					
Sunnyside Unit					2,000
Tieton Unit					3,250
Wapato					9,000
Total				32,466	384,335

[1] Power may be developed on other projects but data not completed.
[2] Maximum safe observed output of plant.
[3] Slight change from previous reports which gave rated instead of actually measured output.

TABLE 7.—*Irrigable area.*

Projects.	Units.		
	Name.	Area.	Total.
		Acres.	*Acres.*
Arizona: Salt River	Gravity system	190,000	230,000
	Pumping system	40,000	
Arizona-California: Yuma	All units	131,000	131,000
California: Orland	....do	14,307	14,307
Colorado: Grand Valley	....do	53,000	53,000
Colorado: Uncompahgre	....do	140,000	140,000
Idaho:			
Boise	....do	207,000	207,000
Minidoka	Gravity system	70,025	118,025
	Pumping system	48,000	
Kansas: Garden City	All units	10,677	10,677
Montana: Blackfeet	Two Medicine unit	48,000	122,500
	Badger	33,000	
	Cut Bank and Carlow	38,000	
	Birch	3,500	
Montana: Flathead	Jocko division	16,000	152,000
	Mission division	23,000	
	Post	30,000	
	Crow	14,000	
	Pablo	40,000	
	Polson	6,000	
	Big Arm	3,000	
	Camas	20,000	
Montana: Fort Peck	Little Porcupine	2,000	152,000
	Poplar River	28,000	
	Big Porcupine	4,000	
	Big Muddy	16,000	
	Missouri River	84,000	
	Galpin Bottom pump	10,000	
	Milk River	8,000	
Montana:			
Huntley	All units	32,405	32,405
Milk River	Malta division	12,800	219,557
	Other divisions	206,757	
Sun River	Fort Shaw unit	16,346	216,346
	Other units	200,000	
Montana-North Dakota: Lower Yellowstone.	First unit	40,914	60,116
	Extensions	19,202	
Nebraska-Wyoming: North Platte	North Platte C. & C. Co	17,837	129,270
	First lateral district	36,700	
	Second lateral district	34,100	
	Third lateral district	38,000	
	Miscellaneous tracts	2,573	
Nevada: Truckee-Carson	First unit	96,573	206,000
	Other units	109,427	
New Mexico:			
Carlsbad	All units	20,277	20,277
Hondo	....do	10,000	10,000
New Mexico-Texas: Rio Grande	Leasburg unit	25,000	155,000
	Other units	130,000	
North Dakota: North Dakota Pumping	Buford-Trenton unit:		15,025
	First division	4,050	
	Extensions	1,375	
	Upper Bottom division	2,600	
	Lower Bottom division	4,000	
	Trenton Flat	3,000	
	Williston unit:		11,289
	First division	8,189	
	West Bottom division	1,900	
	East Bottom division	1,200	
Oregon: Umatilla	Hermiston unit	6,968	25,000
	Second unit	4,350	
	Third unit	3,957	
	Fourth unit	1,976	
	Umatilla unit	1,150	
	Other units	6,599	
Oregon-California: Klamath	First unit	29,700	70,700
	Second unit	6,000	
	Tule Lake unit	35,000	
South Dakota: Belle Fourche	All units	100,000	100,000
Utah: Strawberry Valley	....do	60,000	60,000
Washington: Okanogan	First unit	2,018	10,071
	Second unit	6,085	
	Third unit	464	
	Old water rights	1,353	
	Town of Okanogan	151	

TABLE 7.—*Irrigable area.*

Present status.						
Public land.			State land.	Indian land.	Private land.	Total.
Entered.	Open.	Withdrawn.				
Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
16,000			14,000		200,000	230,000
30,000		44,000			57,000	131,000
		4			14,303	14,307
13,670		16,400			22,930	53,000
15,000		19,000			106,000	140,000
67,219		492	19,040		120,249	207,000
95,100	925		19,900		2,100	118,025
					10,677	10,677
				122,500		122,500
70,000	2,000		5,000	75,000		152,000
				152,000		152,000
23,644	1,969	3,600			3,192	32,405
43,700		28,300	8,700	30,000	108,857	219,557
110,477	2,405	54,108	14,680		34,676	216,346
14,068	3,845		1,644		40,559	60,116
76,061	6,653	644	11,048		34,864	129,270
21,259	328	118,864	102		65,447	206,000
					20,277	20,277
240					9,760	10,000
1,423		11,616			141,961	155,000
288	251	1,640	411		12,435	15,025
54	289		67		10,879	11,289
10,794	156	1,746	38		12,266	25,000
44	23	31,933			38,700	70,700
24,710	3,921	16,000	5,500		49,869	100,000
					60,000	60,000
1,234					8,837	10,071

TABLE 7.—*Irrigable area*—Continued.

Projects.	Units.		
	Name.	Area.	Total.
Washington, Yakima:		*Acres.*	*Acres.*
Sunnyside unit		102,824	137,361
Tieton unit		34,537	
Wyoming: Shoshone	First unit	15,246	164,122
	Second unit	15,954	
	Third unit	3,731	
	Fourth unit	6,378	
	Subsequent units	122,813	
Total, all projects		2,973,048	2,973,048
Per cent		100	100

TABLE 7.—*Irrigable area*—Continued.

Present status.						
Public land.			State land.	Indian land.	Private land.	Total.
Entered.	Open.	Withdrawn.				
Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
1,269	142	1,154	2,880	.....	97,379	102,824
1,563	612	.....	2,274	.....	30,088	34,537
23,105	15,248	117,116	6,430	.....	2,223	164,122
660,922	38,767	466,617	111,714	379,500	1,315,528	2,973,048
22.2	1.3	15.8	3.7	12.7	44.3	100

RECLAMATION ORGANIZATION.

(November, 1913.)

GENERAL OFFICES.

Hon. Franklin Knight Lane, Secretary of the Interior.

Brig. Gen. William L. Marshall, U. S. A., retired, consulting engineer to the Secretary of the Interior.

Frederick Haynes Newell, Director of the Reclamation Service, Washington, D. C.

Arthur Powell Davis, chief engineer, Washington, D. C.

Will R. King, chief counsel, Washington, D. C.

W. A. Ryan, comptroller, Washington, D. C.

I. D. O'Donnell, supervisor of irrigation, Billings, Mont.

Morris Bien, supervising engineer, in charge land and legal division, Washington, D. C.

F. W. Hanna, engineer, in charge engineering division, Washington, D. C.

O. H. Ensign, chief electrical engineer, 605 Federal Building, Los Angeles, Cal.; J. M. Gaylord and C. E. Hogle, engineers.

D. W. Murphy, engineer in charge of drainage, 602 Federal Building, Los Angeles, Cal.

D. C. Henny, consulting engineer, 1005 Spalding Building, Portland, Oreg.

A. J. Wiley, consulting engineer, Boise, Idaho.

W. H. Sanders, consulting engineer, 915 Grand View avenue, Los Angeles, Cal.

J. H. Quinton, consulting engineer, 605 Wright and Callender Building, Los Angeles, Cal.

W. W. Follett, consulting engineer, International (Water) Boundary Commission, consultation on Rio Grande, El Paso, Tex.

S. W. Dick, transportation agent, 777 Federal Building, Chicago, Ill.

C. J. Blanchard, statistician, Washington, D. C.

E. C. Bebb and E. A. Moritz, engineers, Washington, D. C.

J. Y. Jewett, cement expert, 408 Commonwealth Building, Denver, Colo.

E. G. Paul, chief clerk, Washington, D. C.

V. G. Croissant, accountant, Washington, D. C.

H. P. Seidemann, fiscal inspector, Washington, D. C.

C. G. Duganne, fiscal agent, Washington, D. C.

SOUTHERN DIVISION.

ARIZONA, NEW MEXICO, TEXAS, UTAH, CALIFORNIA.

L. C. Hill, supervising engineer, 307 Wright and Callender Building, Los Angeles, Cal.; C. S. Witbeck, examiner; S. B. Taggart, chief clerk.

Salt River project.—C. H. Fitch, project manager, Phoenix, Ariz.; W. A. Farish, engineer; I. C. Harris, engineer, power division; W. P. Marine, chief clerk; H. E. Edington and D. K. Clint, fiscal agents.

Yuma project.—F. L. Sellew, project engineer, Yuma, Ariz.; A. N. Kelley, irrigation manager; J. R. Stilson, chief clerk and fiscal agent.

Rio Grande projcct.—L. M. Lawson, project engineer, El Paso, Tex.; F. Teichman, engineer; J. D. Stannard, engineer; P. W. Dent, examiner; F. S. Cundiff, chief clerk; E. G. McCoy, fiscal agent; H. J. Gault, engineer, Las Cruces, N. Mex.; Earl Patterson, junior engineer, Selden, N. Mex.

Elephant Butte Dam.—E. H. Baldwin, construction engineer, Elephant Butte, N. Mex.; L. J. Charles, assistant engineer; J. L. Segall, chief clerk; J. C Gawler, fiscal agent.

Carlsbad project.—L. E. Foster, assistant engineer, in charge of operation and maintenance, Carlsbad, N. Mex.; V. L. Minter, fiscal agent.

Hondo project.—C. A. May, clerk, in charge of operation and maintenance. Carlsbad, N. Mex.

Strawberry Valley project.—J. L. Lytel, project engineer, Provo, Utah; A. J. Hughes, chief clerk.

PACIFIC DIVISION.

CALIFORNIA, OREGON, NEVADA.

E. G. Hopson, supervising engineer, 202 Central Building, Portland, Oreg.; O. P. Morton and E. S. Taylor, examiners.

Orland project.—A. N. Burch, irrigation manager, Orland, Cal.; C. H. Lillingston, chief clerk and fiscal agent.

Truckee-Carson project.—D. W. Cole, project engineer, Fallon, Nev.; Augustus Griffin, superintendent of irrigation; F. G. Hough, chief clerk; J. R. Post and G. W. Brown, fiscal agents.

Lahontan Dam.—F. H. Tillinghast engineer, Lahonton Nev.; L. G. Maney, superintendent of construction; H. N. Bickel, principal clerk.

Umatilla project.—H. D. Newell, project engineer, Hermiston, Oreg.; J. M. Griffin, superintendent of irrigation; C. W. Kellogg, chief clerk and fiscal agent.

Klamath project.—W. W. Patch, project engineer, Klamath Falls, Oreg.; Wm. Sargent, engineer; B. E. Hayden, assistant engineer, operation and maintenance; C. C. Hogue, chief clerk and fiscal agent.

Central Oregon investigations.—John T. Whistler, engineer in charge, 202 Central Building, Portland, Oreg.

NORTHERN DIVISION.

MONTANA, NORTH DAKOTA, WYOMING.

H. N. Savage, supervising engineer, Great Falls, Mont.; W. J. Egleston, examiner; C. P. Williams, engineer; G. O. Sanford, inspector of operation and maintenance.

Blackfeet project.—C. J. Moody, project engineer, Browning, Mont.; C. E. Frisbee, chief clerk; A. L. Erickson, fiscal agent.

Flathead project.—E. F. Tabor, project engineer, St. Ignatius, Mont.; E. D. Covell, assistant engineer; W. H. Meglasson, principal clerk; R. C. Elting, fiscal agent.

Fort Peck project.—R. M. Connor, project engineer, Poplar, Mont.; Frank Nivens, chief clerk and fiscal agent.

Huntley project.—R. H. Fifield, project manager, Huntley, Mont.; E. B. Le Claire, chief clerk and fiscal agent.

Milk River project.—R. M. Snell, project engineer; E. E. Roddis, assistant examiner, Malta, Mont.; W. W. Schlect, engineer, Vandalia, Mont.; G. E. Stratton, engineer, Glasgow, Mont.; H. W. Bruen, chief clerk; C. B. Mauser, fiscal agent, Malta, Mont.

St. Mary storage unit.—Joseph Wright, engineer, Babb, Mont.; C. E. Frisbee, chief clerk, Browning, Mont.; A. L. Erickson, fiscal agent, Browning, Mont. Erickson, fiscal agent, Browning, Mont.

Sun River project.—J. B. Bond, project engineer, Fort Shaw, Mont.; C. A. Peavey, chief clerk; H. T. Caldwell, fiscal agent.

North Dakota Pumping project.—W. S. Arthur, chief clerk and fiscal agent, Williston, N. Dak.

Lower Yellowstone project.—L. H. Mitchell, project manager, Savage, Mont.; C. H. Young, chief clerk; R. M. Reid, fiscal agent.

Shoshone project.—W. A. Stebbins, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; C. E. Piatt, chief clerk; T. W. Hause, fiscal agent.

CENTRAL DIVISION.

COLORADO, KANSAS, OKLAHOMA, SOUTH DAKOTA, NEBRASKA, WYOMING.

R. F. Walter, supervising engineer, 519 Commonwealth Building, Denver, Colo.; A. R. Honnold, examiner; J. A. Dolphin, chief clerk and fiscal agent.

Grand Valley project.—J. H. Miner, project engineer, Grand Junction, Colo.; O. T. Reedy, engineer; E. R. Mills, chief clerk; A. L. Collins, fiscal agent.

Uncompahgre Valley project.—Fred D. Pyle, manager, Montrose, Colo.; J. H. Fertig, assistant engineer; J. R. Alexander, examiner; J. M. Luney, chief clerk; E. R. Furstenfeld, fiscal agent.

North Platte project.—Andrew Weiss, project engineer, Mitchell, Nebr.; Paul Rothi, irrigation manager; O. P. Burrows, chief clerk; M. T. Murray and J. R. Ummel, fiscal agent.

Pathfinder Dam.—H. D. Comstock, assistant engineer, Alcova, Wyo.

Belle Fourche project.—F. C. Magruder, project engineer, Newell, S. Dak.; R. B. Smith, chief clerk; T. E. Jones, fiscal agent.

IDAHO DIVISION.

IDAHO, OREGON, WYOMING.

F. E. Weymouth, supervising engineer, Boise, Idaho; B. E. Stoutemyer, examiner; F. L. Cavis, chief clerk; S. F. Hedden, fiscal agent.

Boise project (distribution unit).—G. H. Bliss, project manager, Boise, Idaho.

Boise River storage unit.—C. H. Paul, construction engineer, Arrowrock, Idaho; F. T. Crowe, contracting engineer, in charge of work in Pioneer Irrigation District; James Munn, superintendent of construction; A. B. Mayhew, engineer; R. R. Clawson, principal clerk.

Minidoka project.—P. M. Fogg, project manager, Rupert, Idaho; F. N. Cronholm, superintendent of construction; C. A. Lyman, chief clerk; N. K. Jensen, fiscal agent.

Minidoka power and pumping stations.—Barry Dibble, engineer, Minidoka, Idaho.

Snake River storage unit (Jackson Lake Dam enlargement).—F. A. Banks, Boise, Idaho; R. W. Miller, fiscal agent.

WASHINGTON DIVISION.

WASHINGTON.

C. H. Swigart, supervising engineer, North Yakima, Wash.; E. W. Burr, examiner; R. K. Cunningham, fiscal agent.

Okanogan project.—Calvin Casteel, project manager, Okanogan, Wash.; H. A. Yates, chief clerk and fiscal agent.

Yakima project:

Storage unit.—C. E. Crownover, project engineer, Meadow Creek, Wash.; T. E. Brick, chief clerk; W. W. Davis, fiscal agent.

Sunnyside unit.—R. K. Tiffany, project manager, Sunnyside, Wash.; J. G. Heinz, assistant manager; J. S. Moore, assistant engineer; E. M. Philebaum, chief clerk and fiscal agent.

Tieton unit.—R. K. Tiffany, project manager, Sunnyside, Wash.; G. C. Finley, assistant manager, Naches, Wash.; Floyd Foster, chief clerk.

EMPLOYEES.

Force employed June, 1913.

Where employed.	Government employees.				Contractors' force.	Grand total.	
	Secretary's appointees.	Registered.	Others.	Total.		Projects.	Division.
General administration:							
Washington office	90	.....	8	98	.....	98	
Chicago offices	14	.....	.....	14	.....	14	
Denver office (cement)	2	2	.....	4	.....	4	
Los Angeles offices	14	.....	.....	14	.....	14	
Southern division:							130
Division office	4	.....	.....	4	.....	4	
Salt River project	18	93	458	569	95	664	
Yuma project	10	65	293	368	.....	368	
Carlsbad project	3	9	39	51	6	57	
Hondo project	.....	1	5	6	.....	6	
Rio Grande project—							
Leasburg unit	18	28	56	102	.....	102	
Elephant Butte unit	12	29	485	526	.....	526	
Strawberry Valley	10	27	155	192	.....	192	
							1,919

Force employed June, 1913—Continued.

Where employed.	Government employees.				Contractors' force.	Grand total.	
	Secretary's appointees.	Registered.	Others.	Total.		Projects.	Division.
Pacific division:							
Division office	6			6		6	
Orland project	4	8	6	18		18	
Truckee-Carson project	14	62	185	261		261	
Umatilla project	6	15	26	47		47	
Klamath project	8	15	66	89	74	163	
Oregon cooperative work	3	3	10	16		16	
Northern division:							511
Division office	9	2		11		11	
Blackfeet project	8	14	355	377		377	
Flathead project	7	18	75	100	60	160	
Fort Peck project	4	10	250	264	2	266	
Huntley project	6	16	78	100		100	
Milk River project	21	28	73	122	391	513	
St. Mary storage unit	5	17	146	168	11	179	
Sun River project	18	13	131	162	6	168	
North Dakota Pumping	3	8	57	68		68	
Lower Yellowstone project	4	11	47	62	38	100	
Shoshone project	8	34	125	167		167	
Central division:							2,109
Division office	4			4		4	
Garden City project			1	1		1	
Uncompahgre Valley project	15	52	193	260	80	340	
North Platte project	15	91	102	208	205	413	
Belle Fourche project	4	34	64	102	25	127	
Grand Valley project	8	23	178	209		209	
Idaho division:							1,094
Division office	4	1		5		5	
Boise project	36	215	473	724		724	
Minidoka project	18	123	230	371	12	383	
Snake River storage unit	5	6	45	56		56	
Washington division:							1,168
Division office	10	2		12		12	
Okanogan project	4	6	10	20		20	
Yakima project—							
Storage unit	11	80	436	527		527	
Sunnyside unit	12	29	16	57		57	
Tieton unit	3	17	49	69		69	685
Total, June, 1913	478	1,207	4,926	6,611	1,005	7,616	7,616
Total, June, 1912	494	1,235	4,739	6,468	626	7,094	7,094
Increase of 1913 [1]	−16	−28	187	143	379	522	522

[1] Decrease indicated by minus (−) sign.

Injuries to employees.

	1908 [1]	1909	1910	1911	1912
Total classified and unclassified employees (average)	4,245	4,799	5,208	6,189	6,468
Number of injuries reported	62	173	202	328	454
Rate per 1,000 total employees		36.0	38.8	52.9	70.2
Number of claims allowed	32	97	101	129	223
Per cent of total injuries	51.6	56.1	50.0	39.3	49.1
Rate per 1,000 total employees		20.2	19.4	20.8	34.5
Compensation paid [2]	$9,799.54	$19,514.23	$31,543.80	$24,156.67	[3] $29,480.35
Average compensation	$306.23	$201.17	$312.31	$187.26	

[1] From August 1 to Dec. 31, 1908.
[2] Payments do not include cost of hospital and medical services, or subsistence, or cost of employment of other persons in place of those injured.
[3] Payments not completed for injuries received in 1912.

Injuries to employees reported under the act of May 30, 1908.

Project.	Injuries reported.					Claims allowed.					Compensation paid.[2]					
	1908[1]	1909	1910	1911	1912	1908	1909	1910	1911	1912	1908	1909	1910	1911	1912[3]	Total.
Salt River	9	15	9	11	7	5	11	6	8	6	$2,322.25	$4,138.00	$4,397.01	$1,919.25	$720.00	$13,496.51
Yuma	18	7	43	46	51	9	4	20	27	25	2,180.80	191.38	2,711.84	2,424.93	8,115.79	15,624.74
Orland	1	1	1	0	0	1	0	0	0	0	613.00	.....	.....	.....	.....	613.00
Klamath	1	7	0	2	4	1	5	0	0	2	78.00	1,378.81	.....	306.48	172.63	1,935.92
Grand Valley	0	0	0	0	8	0	0	0	0	3	.....	.....	.....	.....	177.92	177.92
Uncompahgre Valley	3	40	28	11	8	1	29	21	6	1	30.00	5,462.24	11,698.45	1,468.79	62.33	18,721.81
Minidoka	0	7	10	5	6	0	5	9	6	2	.....	854.85	2,588.25	253.75	60.20	3,757.05
Boise	0	6	11	66	120	0	6	6	10	78	.....	991.63	547.13	2,403.66	8,146.67	12,089.09
Snake River storage	0	1	11	16	0	0	1	9	4	0	.....	859.50	1,629.18	280.38	.....	2,769.06
Garden City	0	3	0	0	0	0	1	0	0	0	.....	77.46	.....	.....	.....	77.46
Blackfeet	0	5	3	3	2	0	2	1	2	1	.....	282.50	1,417.90	.....	52.20	1,752.60
Flathead	0	2	5	14	10	0	1	3	5	5	.....	110.50	555.25	1,541.38	481.11	2,688.24
Fort Peck	0	0	0	2	0	0	0	0	0	0	.....	.....	.....	.....	.....	.....
Huntley	0	2	0	0	2	0	0	0	0	2	.....	.....	.....	.....	77.50	77.50
Milk River	0	6	6	0	3	0	5	3	0	1	.....	721.10	581.77	.....	47.10	1,349.97
St. Mary storage	0	0	0	2	3	0	0	0	0	0	.....	.....	49.87	316.58	.....	366.45
Sun River	0	1	1	0	0	0	1	1	0	0	.....	209.44	456.32	.....	.....	665.76
Lower Yellowstone	2	20	3	0	8	2	8	1	0	2	1,066.44	1,277.91	733.00	.....	145.12	3,222.47
North Platte	1	3	7	8	12	0	3	3	7	4	.....	320.28	1,071.60	2,656.20	85.10	4,133.18
Truckee-Carson	0	0	0	7	15	0	0	0	3	9	.....	.....	.....	314.95	2,074.45	2,389.40
Carlsbad	0	0	0	0	1	0	0	0	0	1	.....	.....	.....	.....	.....	.....
Rio Grande	2	1	0	54	95	1	1	0	20	41	63.75	23.44	.....	1,049.70	1,973.71	3,110.60
North Dakota Pumping	6	2	5	1	1	1	1	2	1	0	30.00	199.99	123.51	601.21	.....	954.71
Belle Fourche	3	0	1	4	1	1	0	1	3	0	790.40	.....	208.00	192.36	.....	1,190.76
Strawberry Valley	3	15	14	33	54	0	1	4	12	21	.....	1,090.50	626.60	4,512.88	3,577.69	9,807.67
Okanogan	1	3	0	0	0	1	2	0	0	0	270.00	90.75	.....	.....	.....	360.75
Yakima	11	24	36	39	28	8	8	9	13	9	2,228.65	1,055.45	2,013.77	3,773.77	671.98	9,743.62
Shoshone	1	2	8	4	15	1	2	2	2	10	126.25	178.50	134.35	140.40	2,838.85	3,418.35
	62	173	202	328	454	32	97	101	129	223	9,799.54	19,514.23	31,543.80	24,156.67	29,480.35	144,494.59

[1] From August 1 to Dec. 31, 1908.
[2] Payments do not include cost of hospital and medical services, or subsistence, or cost of employment of other persons in place of those injured.
[3] Payments not completed for injuries received in 1912.

ENGINEERING ARTICLES RELATING TO THE WORK OF THE SERVICE.

The following is a partial list of engineering articles relating to the work of the Reclamation Service as published in engineering and technical journals. The list is printed for the information of engineers and others interested in the work.

General articles.—Progress in reclamation of arid lands in the western United States. F. H. Newell, Smithsonian reports, 1901, pp. 407–23; 1903, pp. 827–41; 1904, pp. 373–381; 1907, pp. 331 to 345; 1910, pp. 169–198, illus. (separate, No. 2019).

Cost of diamond drill borings in the Colorado River Valley and at St. Mary Lake, A. P. Davis, Eng. News, Apr. 30, 1903, vol. 49, p. 395.

Correct design and stability of high masonry dams, G. Y. Wisner, Eng. News, Oct. 1, 1903, vol. 50, p. 301.

The U. S. Reclamation Service in the arid West, F. H. Newell, Eng. News, Nov. 26, 1903, vol. 50, p. 485.

Organizing a civil engineering corps for the Reclamation Service, F. H. Newell, Eng. News, July 21, 1904, vol. 52, p. 58.

Experiments on reinforced concrete pipe for the U. S. Reclamation Service, illus., J. H. Quinton, Eng. News, Mar. 9, 1905, vol. 53, p. 246. (See also W. S. Paper, No. 143, U. S. G. S.)

Evaporation observations in the United States, with map, H. H. Kimball, Eng. News, Apr. 6, 1905, vol. 53, p. 353.

The U. S. Reclamation Service (organization and progress), F. H. Newell, Eng. News, June 15, 1905, vol. 53, p. 610.

Engineering features of work under construction by Reclamation Service, Eng. News, July 20, 1905, vol. 54, p. 70.

Investigation of stresses in high masonry dams of short spans, illus., G. Y. Wisner and E. T. Wheeler, Eng. News, Aug. 10, 1905, vol. 54, p. 141.

Depth of thread of mean velocity in rivers, F. W. Hanna, Eng. News, Jan. 11, 1906, vol. 55, p. 47.

Low unit storage costs of some of U. S. Reclamation Service reservoirs, Eng. News, May 10, 1906, vol. 55, p. 522.

Construction of irrigation works by U. S. Reclamation Service (editorial), Eng. News, Nov. 1, 1906, vol. 56, p. 462.

Inspection of irrigation works and report on labor conditions (short), F. H. Newell, Eng. News, Dec. 6, 1906, vol. 56, p. 600.

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